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THE

JOURNAL OF BOTANY,

BRITISH AND FOREIGN.

EDITED BY

HENRY TRIMEN, M.B., F.L.S.,

BRITISH MUSEUM,

ASSISTED BY

S. LE M. MOORE, F.L.S.,

ROYAL HERBARIUM, KEW.

NEW SERIES. VOL. VI.

(VOL. XV. OF THE ENTIRE WORK.)

Illustrated with Plates and Woodcuts.

MISSOURI
BOTANICAL
GARDEN.

LONDON:

RANKEN & CO., DRURY HOUSE, ST. MARY-LE-STRAND.

ANDREW ELLIOT, 17, *Princes Street, Edinburgh*; J. ROTHSCHILD, *Paris*;

ASHER & Co., *Berlin*; WESTRMANN, *New York*.

1877.

LONDON:
PRINTED BY RANKEN AND CO., DRURY HOUSE,
ST. MARY-LE-STRAND, W.C.

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THE

JOURNAL OF BOTANY,

BRITISH AND FOREIGN.

Original Articles.

NEW PALMS COLLECTED IN THE VALLEY OF THE AMAZON IN NORTH BRAZIL, IN 1874.

By James W. H. Trail, M.A., M.B., F.L.S.

(Tab. 184.)

(*Continued from* N.S. vol. v., p. 359.)

16. *Bactris simplicifrons*, Mart. (Trail hb. Palm, 169, 28, 32, 78, 63, &c.) (= *B. brevifolia*, Spruce, *B. negrensis*, Spruce, *B. carolensis*, Spruce, *B. acanthocnemis*, Mart.?, *B. ericetina*, Barb. Rod.?, *B. gracilis*, Barb. Rod.?, *B. arenaria*, Barb. Rod.?, *B. xhantocarpa*, Barb. Rod.?). — Inermis, vel rarius ad foliorum vaginas et petiolos aculeata; caudice arundinaceo, $\cdot 6^{m}$-$1\cdot 8^{m} \times \cdot 004^{m}$-$\cdot 01^{m}$; foliis bifurcis simplicibus (raro pinnis $1\frac{1}{2}$-jugis), $\cdot 30^{m}$-$\cdot 75^{m}$; alis $\cdot 17^{m}$-$\cdot 35^{m} \times \cdot 028^{m}$-$\cdot 075^{m}$ rhomboideo-ligularibus, vel lanceolato-rhomboideis apice subfalcatis margine setoso-ciliatis et apice penicillatis; venis primariis utrinque 5-12, subrectis vel bis flexis, directione media angulum 30°-45° cum costa efformantibus; petiolo (vagina inclusa) primo tomento arachnoideo albido obsesso, mox calvo; lamina glabra, supra jucunde viridi, subtus pallidiore; spatha interiore inermi vel raro subaculeata, $\cdot 05^{m}$-$\cdot 08^{m}$, striata; spadice simplici, pedunculo $\cdot 025^{m}$-$\cdot 010^{m}$ versus apicem abrupte decurvo, rachi $\cdot 25^{m}$-$\cdot 040^{m}$; fl. ♀ viridi, calyce et corolla subæquilongis, urceolato-cupularibus, ad medium 3-partitis; drupa ovoidea vel globosa, rostellata, rubra, glabra, $\cdot 004^{m}$-$\cdot 006^{m}$; endocarpio ovato-globoso, nigro.

Hab.—Per totam planitiem æquatorialem Brasiliæ.

Var. α. *brevifolia*, Spruce (sp.). (Trail hb. Palm., 169, &c.)—Alarum latitudo dimidiam vel tertiam partem longitudinis æquans; petiolus plerumque brevis, inermis; venæ utrinque (7-) 9-12, bis flexis; alæ rhomboideo-lanceolatæ.

Hab.—In prov. "Amazonas" et ad Aramanahy, Rio Tapajos.

Var β. *negrensis*, Spruce (sp.), et sub-var. *minor*, Spruce (Trail hb. Palm., 28, 32, &c.).—Alarum longitudo septies vel octies latitudine major; alæ ligulari-rhomboideæ; petiolus plerumque longior, inermis (rarius subaculeatus); venæ utrinque 5-8, subrectæ.

Hab.—Undique per provincias Parænsem et Amazonensem.

Var. γ. *carolensis*, Spruce (sp.) (Trail hb. Palm., 78).—Alarum longitudo 4-5-plo latitudine major; folia iis var β. simillima; vagina et

petiolus ad basin aculeis ·002^{m}-·010^{m} nigris vel nigro-badiis, e basi albida ortis armati; venæ utrinque 7-8.

Hab.—Ad Rio Padauiri, brachium fl. Negro.

Var. δ. *subpinnata* (Trail hb. Palm., 63).—Folia bifurca (longitudo latitudine 4½-6-plo major) vel uno alterove latere bipinnata; pinna lanceolata (·22^{m}-·25^{m} × ·025^{m}-·030^{m}); petiolus (vagina ·15^{m} inclusa) ·45^{m} subaculeata; venæ utrinque 7.

Hab.—Ad Barcellos, in prov. Amazonas.

Obs. 1.—This little Palm is very common throughout the whole valley of the Amazon in the forests seldom or never flooded by the rivers. It is subject to considerable variation in armature, number of veins in the leaves, &c., but the varieties are so intimately connected that they must be regarded as belonging to a single species.

Obs. 2. *B. acanthocnemis*, Mart., seems from the description in "Palmetum Orbignianum," p. 167, to be very close to, if not identical with my var. δ. (*subpinnata*), but I have not ventured to sink the name as a synonym, owing to specimens in the Kew Herbarium (determined by Grisebach) from Trinidad being somewhat different.

The following, described by Dr. Rodriguez (Enum. Palm. Nov., &c.) as new species, seem to me to be forms of *B. simplicifrons*, Mart., though the very brief descriptions are hardly recognisable sometimes. I quote the descriptions for the better elucidation of the subject, italicising the points in which they seem in any way to differ from the type. The numbers are those given by Dr. Rodriguez.

"1. *B. ericetina* (l.c., p. 26).—Stipite humili, crassitie pennæ anserinæ, inermi; frondibus indivisis, lanceolatis, bifidis; petiolo et rachide tomento fusco subrubro obsitis. *Hab.*—Ad ripas ericetas superioris fluvii Jamunda. Floret in Septembri. (Barb. Rod. hb. Palm., 353.)"

"4. *B. gracilis* (l.c., p. 27).—Stipite humili, inermi, erecto; frondibus indivisis (foliolis connexis) furcato bipartito 8-nervatis; petiolo basi invaginante, oblique truncato, aculeato; spadice simplice; *spatha tenuiter aculeata*; drupa turbinata coccinea. Habitu *B. simplicifrons*, Mart. *Hab.*—In insula Apuhy contra cataractas ejusdem nominis fluvio Tapajos sub umbris silvarum. Fructus maturescunt augusto. (Barb. Rod hb. Palm., 229.)"

"8. *B. arenaria* (l.c., 29.)—Stipite humili, inermi, vestito vaginis persistentibus frondium *quæ sunt* suberectæ, indivisæ aut *interrupte pinnatæ ab uno latere*, bifidæ cuneatæ; petiolo invaginante (*vagina aculeata*); spadice suberecto, indiviso; spatha inermi. *Hab.*—In tractibus sabulosis ad origines fluvii Hauinchá, qui influit in flumen Jamunda. Flores et fructus virescunt Octobri. Crescit simul cum Attalea agresti. (Barb. Rod. hb. Palm., 363.)"

This seems to be the same as *B. simplicifrons*, var. δ., though the description is too brief for certainty.

"11. *B. xanthocarpa* (l.c., 30.)—Stipite humili, arundinaceo; frondibus indiviso-falcatis; *spadice bipartito*, raro simplici; *drupa* globoso-turbinata, *lutea*. *Hab.*—In tractu ad cataractas fluvii Trombetas sito. Fructus maturescunt Martio. (Barb. Rod. hb. Palm., 340.)"

17. *B. mitis*, Mart.—Inermis, vel ad vaginas et petiolos aculeata; caudice 1^{m}-3^{m}, arundinaceo; foliis interrupte pinnatis; pinnis 3-10-jugis, lanceolatis, falcato-acuminatis (acumine longo, tenui), tenuibus,

·09ᵐ-·20ᵐ × ·012ᵐ-·040ᵐ, infimis brevioribus, 2-veniis, mediis 1-veniis, apicalibus latioribus 2-3-veniis, omnibus læte viridibus, glabris, secus apicem ad margines setoso-ciliatis ; vagina et petiolo tomento arachnoideo albido obsessis, dein nudis, ·20ᵐ-·30ᵐ ; spatha interiore inermi vel setosa ; spadice simplici vel bi-trifido, ·06ᵐ, pedunculo ·035ᵐ, inermi vel hirto, rachi glabra ; fl. ♀ virescenti, calyce cupulari, tripartito, corolla ovoideo-urceolata, tridentata, quam calyx duplo vel dimidio longiore ; drupis pisi minoris magnitudine, globosis, apiculatis, coccineis, glabris.

Subsp. 1. *mitis*, Mart.—Inermis, 1ᵐ ; pinnis oblongo-oblanceolatis, 6-10-jugis ; spadice bi-trifido, pedunculo hirto ; spatha interiore antice setis fuscis adpressis munita.

Hab.—Ad fl. Japurá.

Subsp. 2. *Uaupensis*, Spruce (Palm. Amazon., p. 145).—Inermis, 2ᵐ ; pinnis 9-jugis, lineari-lanceolatis ; spadice simplici ; spatha inermi, juniore fulvo-leprosa.

Hab.—Ad fl. Uaupés (Spruce hb. Palm., 77).

Subsp. 3. *inermis* (Trail hb. Palm., 10, 137, 181).—Inermis 1ᵐ-1·5ᵐ ; pinnis 3-6-jugis, lanceolatis, solitariis vel 2-natim aggregatis ; spadice simplici vel bifido ; spatha inermi (rarissime sparse setosa).

Hab.—Ad "Caxociras da Porteira" ad fl. Trombetas in sylvis humidis gregarie crescit, etiam ad Barreiras de Mary, fl. Purus ; ad fl. Javary ; et prope Pará.

Subsp. 4. *tenuis*, Wallace (Palms of the Amazon, pl. 33.) (Trail hb. Palm., 64 et 65 ; Spruce hb. Palm., 78)—Palma ad vaginas et petiolorum bases aculeis nigris tenuibus vel latis, ·004ᵐ-·008ᵐ sparse armata ; foliis minoribus, pinnis 3½-4-jugis lanceolatis vel lato-lanceolatis ; spadice simplici ; spatha inermi.

Hab.—In sylvis fl. Negro a Barcellos sursum.

Obs.—As will be seen from the above descriptions, these four forms are very closely allied, and certainly cannot be regarded as more distinct than subspecies of one species. Further observations may possibly lead to their being regarded as varieties simply, but our present information would scarcely warrant such a conclusion.

18. *B. elegans* (Trail hb. Palm., 22, 134).—Caudicibus 2-3 ex eodem rhizomate ortis, ·75ᵐ-1·20ᵐ × ·008ᵐ-·015ᵐ erectis vel flexuosis, ad nodia (in parte superiore) aculeorum semiannulis armatis ; aculeis nigris, compressis ·02ᵐ et minoribus, posthac caducis ; caudice ad apicem solum vaginis foliorum vestito ; foliis ·75ᵐ, interrupte pinnatis ; petiolo ·20ᵐ-·25ᵐ (vagina ·10ᵐ-·13ᵐ inclusa) squamulis rufis deciduis dense leproso et aculeis tenuibus, acutis, ·02ᵐ-·03ᵐ, nitidis nigris vel medio pallidioribus 2-6-natim aggregatis armato ; costa setis et pubescentia badiis dense vestita ; pinnis 20-25-jugis, complanis, in greges 2-4 oppositos vel alternos approximatis, gregibus inferioribus 3-4-(12-), superioribus 6-8-(19-) jugatis ; pinnis ·07ᵐ-·20ᵐ × 012ᵐ-·022ᵐ obovato-lanceolatis, apice acutis, bifidis (dente superiore quam inferior 4-5-plo longiore, inferiore subbifido), ad margines setis 20 nigris ciliatis, nitente viridibus, supra subtusque concoloribus, glaberrimis, univeniis, apicalibus 3-veniis ; spatha exteriore ·08ᵐ × ·008ᵐ bialata ; spatha interiore ·35ᵐ, anguste fusiformi, sublignea vel coriacea, aculeis tenuibus nigris crebris, armata ; spadice bifido ·28ᵐ, pedunculo ·15ᵐ-·20ᵐ, decurvo, pubescente et apicem versus setis nigris semiadpressis

armato; ramis ·08^{m}-·11^{m} tenuibus, inferiore paullo breviore, ad basin setosis; fl. ♀ calyce et corolla quam ille duplo longiore cupularibus, ore 3-dentatis, inermibus; ovario globoso stigmate sessili subtrigono apiculato; drupa —? (Tab. 184, fig. I.)

Hab.—In sylvis primævis nunquam inundatis ad São Antonio, fl. Tapajos; ad Lago Juruty; ad Barreiras de Maniwa, fl. Purus; et ad Barreiras de Ticuite, fl. Jutahi.

Obs. 1.—Dr. Barbosa Rodriguez has (l.c., p. 35) given a diagnosis of this species, with which (along with the name) I furnished him; unfortunately that diagnosis has been so altered (in being printed?) as to be in many places almost unintelligible even to myself, and therefore to be of little use. Dr. R. mentions that he had found the same species on Serra de Curumu, on the Trombetas river.

Obs. 2.—Owing to want of knowledge of the ripe fruit, I am not sure that this palm belongs to the section in which it is placed in the analytical key, but am induced to place it there by the structure of the fl. ♀, &c.

Obs. 3.—From all other known species of palms occurring in the Amazon Valley *B. elegans* is readily distinguished by the numerous pinnæ, all on the same plane, and all bifid at the tip, and by the bifid spadix; this last character distinguishes it from the other species with bifid pinnæ, all of which have several branches in the spadix.

19. *B. cuspidata*, Mart. (Trail hb. Palm., 35, 44, and 224) (= *B. floccosa*, Spruce (sp.), S. hb. Palm., 37).

Var. *α. coriacea* (Trail hb. Palm., 224 in parte).—Ab exemplo typico differt ut sequitur; pinnis 8-9-jugis, crassioribus, lato-lanceolatis, abrupte cuspidatis ·12^{m}-·20 × ·035^{m}-·06^{m}; spadice 6-fido.

Hab.— Prope urbem Pará.

Var. *β. angustipinnata* (Trail hb. Palm., 225).—Pinnis 9-12-jugis, tenuibus, quasi papyraceis, lineari-lanceolatis, longe acuminatis, ·25^{m}-·28^{m} × ·025^{m}, subtus fere glabris; petiolo subarmato sparse pubescente; spadice plerumque 3-fido.

Hab.—Prope urbem Pará.

20. *B. hirta*, Mart.; subsp. *pulchra* (Trail hb. Palm., 98).—A *B. hirta*, Mart., differt ut sequitur (conf. Hist. Palm., vol. ii., pp. 104-5, t. 60, et t. 74, f. 1-2).—Caudice ·45^{m}-·75^{m}, vaginis persistentibus usque ad basin vestito; foliis 9-14 contemporaneis, lateralibus et apicalibus; petiolo (vagina ·08^{m} inclusa) ·12^{m}-·15^{m}; costa ferrugineo-leprosa; lamina ·22^{m}-·25^{m} × ·08^{m}-·10^{m}; venis primariis utrinque 6-7 rectis, angulo costali 15°-20°; spatha interiore setis vel aculeis ·01^{m}-·015^{m}; badiis præcipue apicem versus armata; spadice simplici; drupa ovato-globosa, diametro ·003^{m}, rubra (posthac nigro-violacea?) setis nigris armata. (Tab. 184, fig. II.)

Hab.—Prope urbem Manaos (olim Barra) gregarie et abunde crescit in sylvis primævis siccioribus ad Marapatá.

Obs.—The small size and peculiar habit of this species render it unlikely to be mistaken for any other. The characters whereby it may at once be known from its allies are given in the analytical key.

21. *B. tomentosa*, Mart.—Caudice arundinaceo (·60^{m}-2·0^{m} × ·010^{m}-·015) inermi; foliis interrupte-pinnatis, pinnis (3-) 7-12-jugis subfalcato-lanceolatis, acuminatis, supra pubescentibus, vel supra subtusque pilosis; vagina et petiolo aculeis badiis, medio pallidioribus, setisque

armatis; spatha interiore aculeis albido-badiis armata; spadicis simplicis pedunculo pubescente vel setoso; rachi ·035^{m}-·05^{m} dense florifero; fl. ♂, calyce minutissimo in lacinias tres triangulares acutas producto, corolla ·006^{m} ultra medium trifida, petalis ovato-triangularibus, acuminatis; fl. ♀ calyce annulari vel quam corolla duplo breviore tridentato, et corolla cupulari ore brevissime tridentata setis badiis contortis dense vestitis; ovario ovato setuloso; drupa ——.

Subsp. 1. *tomentosa*, Mart. (Trail hb. Palm., 61).—Foliis 1^{m}-1·8^{m}; vagina et petiolo ad medium aculeis compressis ·006^{m}-·025^{m} armata, (ochrea setis vestita), petiolo et costa lepra vel tomento ferruginea dense vestitis; pinnis 7-8-jugis ("utrinque 3-10," Mart.) ·2^{m}-·4^{m} × ·025^{m}-·10^{m} supra atroviridibus, subtus pallidioribus, ad venas brevissime pubescentibus, siccis nigricantibus; spatha interiore ·3^{m} aculeis contortis compressis dense vestita; spadicis pedunculo aculeolis fulvis vestito.

Hab.—Ad ostia fl. Anavilhana, brachii fl. Negro.

Subsp. 2. *capillacea* (Trail hb. Palm., 140).—Foliis ·1^{m}-1·2^{m}; vagina et petioli faciei superiore ad medium aculeolis tenuioribus medio stramineis ·003^{m}-·012^{m} armatis nec leprosis; costa sæpe subflexuosa, haud leprosa, sed pilis ferrugineis (·001^{m}-·003^{m}), tandem caducis dense vestita; pinnis 8-12-jugis, flaccidis, supra subtusque pilis ·001^{m}-·002^{m} obsitis, ideoque canis, ·25^{m}-·33^{m} × 03^{m}-08^{m}; spatha ·12^{m}-·20^{m}, aculeis tenuioribus armata, et pubescentia vestita; spadicis pedunculo pubescente, nec armato.

Hab.—In sylvis ad Barreiras de Pariti, et ad Barreiras de Ypiranga, fl. Purus; floret mense Octobro.

22. *B. longipes*, Popp. (Trail hb. Palm., 210).

Hab.—Ad Boa vista, fl. Madeira.

Var. *exilis* (Trail hb. Palm., 210).—Ab exemplo typico differt ut infra.—Minor, caudice tenuissimo; foliis ·45^{m}-·50^{m}; petiolo (vagina ·10^{m} inclusa) ·15^{m}-·20^{m}, setis brevissimis ferrugineis vestito; alis triangulari-lanceolatis ·25^{m}-·30^{m} × ·05^{m}; venis primariis utrinque 9, angulo costali 17°-32°; spatha interiore fragili, setosa; spadice parvo, bifido.

Hab.—Ad Barreiras de Mutum, ad fl. Jutahi.

Obs.—*B. longipes* may possibly be regarded as a subspecies of the next species, to one of the forms of which it comes very close, differing from it chiefly in the smaller size, in the long and only slightly-armed petioles, and in the fewer veins in the leaf; while they agree in the spathes, spadices, flowers, and fruit, as well as in general habit.

23. *B. pectinata*, Mart. (Trail hb. Palm., 214, 196, 92, 189, 220, 11, 27, 66, 91, 69, 23, 222).—Caudicibus arundinaceis ·1^{m}-·3^{m} × ·008-^{m}·015^{m}, inermibus, raro ad internodia aculeatis, plerumque 2-6 ex eodem rhizomate ortis, erectis, versus apicem vaginis persistentibus aculeatis obvelatis; foliis ·5^{m}-·2^{m}, simplicibus bifurcis, vel varie pinnatisectis, vel interrupte (raro regulariter) pinnatis, supra subtusque pilosis, vel subtus ad venam mediam solum; pinnis (6-) 10-24-jugis, 3-8-natim aggregatis, lineari-lanceolatis acuminatis, vix subfalcatis, ad margines setoso-ciliatis, ·12^{m}-·45^{m} × ·012^{m}-·025^{m}; foliorum simplicium venis primariis utrinque 14-20 subrectis, angulo costali 15°-22°; foliorum vaginis et petiolis aculeis nigris tenuibus ·025^{m}

minoribusque armatis, lepra ferruginea vestitis; costa plus minus setulis brevibus obsita; spatha exteriore ·05^{m}-·1^{m} inermi vel sparsissime aculeolata, coriacea, apice bifida; spatha interiore fusiformi, ·15^{m}-·22^{m} setis vel aculeis subnigris vel badiis adpressis, sæpe contortis, tenuibus, ·004^{m}-·006^{m} præcipue versus apicem armata; spadice ·12^{m}-·20^{m} in ramos 2-4 fisso, setis pilisque subnigris villoso, ramis ·05^{m}-·10^{m}, pedunculo semierecto vel angulo recto flexo; fl. ♂ ·002^{m}-·003^{m}, calyce membranaceo, minuto, in lacinias 3 subulatas producto, petalis ad quartem partem coalitis ovatis, acuminatis; fl. ♀, calyce brevissimo, triangulari, membranaceo, inermi; corolla cupulari, ore breviter 3-denticulata, coriacea, extus pilis erectis hirsuta vel villosa, ovario lageniformi; drupa inermi, vel plus minus setis nigris brevibus armata, globosa vel obovata, rostellata, ·004^{m}-·008^{m}, coccinea; putamine obovato.

Subsp. 1. *microcarpa*, Spruce (sp.) (Spruce hb. Palm., 31, Trail hb. Palm., 214).—Foliis interrupte pinnatis; pinnis 22-27-jugis, 3-8 (-12) natim aggregatis (·25^{m} × ·020^{m}-·025^{m}, apicalibus brevioribus), supra subtusque dense pilis fulvis vestitis; costa plus minus hirsuta; spadicis ramis 3-4; drupa obovata vel globosa, ·004^{m}-·007^{m} × ·004-·006^{m}, pilosa.

Hab.—"In sylvis recentioribus fl. Negro" (Spruce); ad Santarem fl. Jutahi; floret mense Februario.

Var. *nana* (Trail hb. Palm., 196).—Minor; caudice ·30^{m}-·45^{m} × ·005^{m}; petiolo aculeis et setis badiis retroflexis armato; foliis (vagina ·10^{m} exclusa) ·50^{m}, pinnis 21-23-jugis ·09^{m}-·13^{m} × ·012^{m}, læte viridibus; spatha interiore aculeis tenuissimis retroflexis armata; spadice bifido?

Subsp. 2. *hylophila*, Spruce (sp.) (S. hb. Palm. 15, Trail hb. Palm., 92, 189, 220).—Foliis plerumque regulariter pinnatis, rarius simplicibus bifurcis supra glabris, subtus ad venulas pilosulis; pinnis 15-20 (-24) jugis, ·25^{m}-·45^{m} × ·015^{m}-·030^{m}; costa ciliata; spadice 2-3-fido; drupa obovata ·006^{m}-·012^{m} × ·005-·008^{m} supra medium pilosa.

Hab.—Ad Barcellos et ad Manaos, fl. Negro, et ad fl. Javary.

Var. *α. setipinnata*, Barb. Rod. (sp.) (Trail hb. Palm., 11 et 27) (vide Barb. Rod., l. c., p. 32, no. 15).—Minor; foliis ·60^{m}-·90^{m}, tenuioribus; pinnis 16-17-jugis, pectinatis ·20^{m}-·28^{m} × ·012^{m}-·018^{m} supra subtusque sparse ad venulas pilosis; spadice bifido.

Hab.—Ad ripas fl. Trombetas, et ad lacum Juruty in sylvis primævis.

Obs.—This variety approaches *microcarpa* in having the pinnæ pilose above as well as below, but seems to me more closely allied to *hylophila* by the number and arrangement of the pinnæ, and by the bifid spadix.

Var. *β. subintegrifolia* (Trail hb. Palm., 66, 91).—Foliis simplicibus bifurcis ad vaginas, petiolos, et costas subtus valide aculeatis, ala secus marginem exteriorem ·75^{m}, costa ·30^{m}-·40^{m}, ala ·12^{m}-·15^{m} lata, subtus ad venulas pilosula, supra glabra; venis utrinque primariis 17-20, subrectis, angulo costali 17°; spadice bifido.

Hab.—In sylvis recentioribus ad fl. Negro.

Obs.—*Bactris integrifolia*, Wallace (Palms of the Amazon, p. 91, plate xxxv.), may be the same as this variety. It is, however,

impossible to identify it with absolute certainty, from the very brief description. The chief difficulties in the way are that Wallace makes no mention of the pubescence on the lower surface of the leaves, while he describes the spines on the petioles and vaginæ as flat, the spadices as very small and erect, and the fruit as globular and black, without mentioning whether it is pilose or not. The fruits become black when they have been ripe for some time.

Subsp. 3. *turbinata*, Spruce (sp.) (S. hb. Palm. 51; Trail hb. Palm., 69).—Foliis interrupte pinnatis vel simplicibus bifurcis, vel varie pinnatisectis, supra glabris, subtus ad venulas vix pubescentibus; pinnis 9-14-jugis, inferioribus 2-4-natim aggregatis, ·25^{m}-·40^{m}; petiolo et costa lepra ferruginea obsitis nec ciliata; spadice bi-trifido; drupa globosa, vel obovata, ·007^{m} diametro, pilosa.

Hab.—In sylvis recentioribus ad fl. Negro.

Var. *Spruceana* (Trail hb. Palm., 23, 222) = *B. simplicifrons ?*, Spruce (Palm. Amazon, p. 148), nec Martii.—Foliis simplicibus, bifurcis, vel in pinnas utrinque 4-14 irregulariter fissis; venis utrinque 14-17, subrectis angulo costali (folii simplicis) 15°-22°; ala ·7^{m} × ·1^{m}, costa ·40^{m}, pinnis singulis ·30^{m} × ·015^{m}.

Hab.—Prope urbem Obydos, et prope urbem Pará.

Obs. 1.—*B. pectinata*, Mart., restricting the name to the form described in the Hist. Palmarum, seems to be most closely allied to *B. turbinata*, Spruce, from which it differs only in the 6-10-jugate pinnæ being more regularly æquidistant, and in the fruits being glabrous; in all the forms above described, however, the fruits vary considerably in hairiness, being frequently subglabrous.

Obs. 2.—Wallace's figure of *B. pectinata*, Mart. (Palms of the Amazon, plate xxviii., p. 77), represents a palm with regularly pinnate leaves, the pinnæ being 18-19-jugate and hairy beneath; in these points and in the bifid spadix it approaches closely *B. hylophila*, from which it differs only in the glabrous fruit. They agree also in their habitat, viz., the forests of the Rio Negro.

Obs. 3.—The following "species" described by Dr. Rodriguez are probably closely allied to *B. pectinata*, though the descriptions are too brief and vague to be of much value:—

"9. *B. Marájá-y.*—Stipite humili, inermi; tomento lanato-tabacino contecto; frondibus interrupte-pinnatis, vagina aculeata; foliolis 2-3-jugis, oblongo-lanceolatis, acuminatis; spadice 5-partito; drupa coccinea, inermi, diametro 0 007^{m}.

"*Hab.*—In superiore parte montis Curumu, plus ducentis pedibus super fluvium Trombetas. Fructus maturescunt aprili. (Barb. Rod. hb. Palm., 358.)"

"14. *B. linearifolia.*—Stipite humili, inermi, erecto, cæspitoso; frondes pectinatæ; petiolus invaginans, aculeatus (aculeis acicularibus, magnis et nigris); rachis filiforme prolongata ultra extrema foliola, quæ sunt linearia, acuminata, marginibus ciliatis; spadix suberectus 2-3-partitus; spatha interior ad verticem aculeata; bacca subglobosa, rubra, inermis.

"*Hab.*—In virgultis prope urbem Provincia Paraensis in via quæ appellatur S. João. Fructus maturescunt martio. (Barb. Rod. hb. Palm., 230.)"

"31. *B. interrupte-pinnata.*—Stipite inermi, brevissime annulata

frondibus interrupte pinnatis; foliolis lineari-lanceolatis; drupa globosa, coccinea, aculeata.

"*Hab.*—In silvis primævis ad lacum Curumú et Cataractas fluvii Tarumá, in fluvio Negro. Fructus maturescunt maio. Indi muncupant Tayaçu-pupunha. . . . (Barb. Rod. hb Palm., 356.)"

This last species may, however, so far as the description goes, be allied rather to *B. acanthocarpa*, Mart., a conclusion rather favoured by the native name.

Obs. 4.—*Bactris fusca*, Œrsted (Naturhist. Foren. Vidensk. Meddel., 1858, p. 43), seems nearly allied to the form *hylophila*, Spruce, with pinnæ 2-4 aggregate, but differs in "spathæ setis et aculeis apicem versus multo longioribus; spadicis ramis 2-5; drupa fusca; fl. ♀ glabris, corolla margine inter dentes glanduloso ciliato, ciliis aggregatis."

24. *B. sphærocarpa* (Trail hb. Palm. 119, 194, 139, 148, 154. —Humilis; caudicibus pluribus ex eodum rhizomate ortis, $\cdot5^{m}$-$1\cdot5^{m} \times \cdot008^{m}$-$\cdot015^{m}$ erectis vel flexuosis, inermibus; foliis $\cdot6^{m}$-$\cdot1^{m}$ simplicibus, bifurcis, ad vaginas petiolosque aculeis tenuibus nigris $\cdot005^{m}$-$\cdot025^{m}$, sparse armatis, et pubescenti-leprosis; vagina $\cdot15^{m}$; petiolo $\cdot1^{m}$-$\cdot3^{m}$; costa $\cdot20^{m}$-$\cdot25^{m}$; alis rhomboideo-lanceolatis vel ligularibus, acuminatis, subfalcatis, $\cdot50^{m}$-$\cdot65^{m} \times \cdot06^{m}$-$\cdot08^{m}$, supra subtusque glabris, apicem versus ad margines setoso-ciliatis et penicillatis; venis primariis utrinque 9-11, subtus sparse leprosis, subrectis, angulo costali 10°-27°; spatha exteriore acuta, bialata, coriacea; spatha interiore $\cdot12^{m}$ fusiformi, acuta, aculeis nigris compressis, $\cdot004^{m}$-$\cdot006^{m}$, adpressis armata; spadice simplici, inermi, $\cdot1^{m}$-$\cdot15^{m}$, pedunculo pubescente, rachi $\cdot025^{m}$-$\cdot035^{m}$; fl. ♂ albis, $\cdot008^{m}$-$\cdot010^{m}$, calyce minutissimo, petalis $\frac{1}{3}$ coalitis, lanceolatis $\cdot009^{m} \times \cdot003^{m}$; staminibus 6, antheris erectis, loculis parallellis, apice basique discretis, versatilibus, filamentis filiformibus quam antheræ $\frac{1}{2}$ brevioribus; fl. ♀ ——; drupa spheroidea, rostellata, diametro $\cdot015^{m}$, glabra, purpurea?; putamine depresso-ovato-globoso, mesocarpio solido, tenui; drupæ calyce et corolla glabris, striatis, marginibus membranaceis, demum laceris, ideoque demum nigro-ciliatis; corolla quam calyx duplo longiore; andrœcei vestigio nullo. (Tab. 184, fig. III.)

Hab.—In sylvis recentioribus in terra alta ad Barreiras de Cupaná, ad Tabocal, fl. Purus, ad Gavião et ad Barr. de Pupunha, fl. Juruá, ad Barr. de Carurú, fl. Jutahi; ad Barr. de Braga, fl. Javary; et ad São Paulo, fl. Solimões.

1. Var. α. *minor* (Trail hb. Palm., 130).—Minor, ad petiolos solos subarmata, aculeis $\cdot005^{m}$-$\cdot015^{m}$; alis $\cdot25^{m}$-$\cdot30^{m} \times \cdot04^{m}$; venis utrinque 8, angulo costali 20°-22°; costa vix $\cdot10^{m}$.

Hab.—Ad Barreiras de Catatiha, fl. Purus in sylvis recentioribus gregarie crescit.

2. Var. β. *ensifolia* (Trail hb. Palm, 119, A. et B.).—Inermis vel subarmata; alis angustis $\cdot32^{m}$-$\cdot70^{m} \times \cdot025^{m}$-$\cdot045^{m}$; venis utrinque 7-8, angulo costali 10°-12° (-17°); costa brevi.

Hab.—Ad Barr. de Carurú, fl. Jutahi.

3. Var. γ. *platyphylla* (Trail hb. Palm., 154).—Ad vaginas petiolosque valide armata; alis $\cdot8^{m}$-$\cdot9^{m} \times \cdot1^{m}$, triangulari-lanceolatis; venis utrinque 14, angulo costali 15°-16°^{m}; costa $\cdot50^{m}$-$\cdot55^{m}$, ideoque foliis vix ad $\frac{1}{3}$ bifurcis.

Hab.—Ad Gavião, fl. Juruá.

Subsp. *pinnatisecta* (Trail hb. Palm., 132).—Foliis pinnatisectis; pinnis 2-jugis oppositis, distantibus, basalibus ligularibus longe acuminatis ·48^{m} × ·03^{m}, apicalibus triangulari-rhomboideis ·50^{m} × ·05^{m}; venis primariis folii utrinque 12 (4+8), subrectis, angulo costali 15°-18°; armatura petioli, spathis et spadice cum *B. sphærocarpa* convenit.

Hab.—Ad Barr. de Catatiha, fl. Purus, cum var. *a. minor*.

Obs.—*B. sphærocarpa* is hardly likely to be confounded with any species save *B. bifida*, Mart., from which it is well distinguished by its smaller size, more deeply-cleft leaves with fewer primary veins which usually form a greater costal angle, less strongly armed vaginæ and petioles, absence of iridescence on the under surface of the dried leaf, calyx and corolla of fl. ♀ both glabrous externally, absence of androœceum in fl. ♀, and smooth spheroidal fruit.

Subsp. *pinnatisecta* most resembles *B. fissifrons*, Mart., from which it is best distinguished by the armature of the leaf (scattered slender spines all round the vagina and petiole in *pinnatisecta*, on the vagina and basal half of only the upper surface of *fissifrons*), and by the simple spadix.

B. sphærocarpa in one form or another is wide-spread and abundant in the tract of country on the south bank of the Solimões or Upper Amazon, and along its southern tributaries, but I have not seen it elsewhere. It is called by the Indians "Marajá-y," a name applied to all small species of Bactris.

25. *B. fissifrons*, Mart. (Trail hb. Palm., 173, 179).—Hab. ad Tonantins et ad Tabatinga, fl. Solimões (drupa spherica, mucrone longo apiculata, glabra ·025^{m} × ·015^{m}; putamine depresso-obovato, gibboso).

Var. *robusta* (Trail hb. Palm., 199).—Major; foliis 1·7^{m}; pinnis 5-6-jugis 1-2-natim aggregatis, longioribus (basalibus ·5^{m} × ·08^{m}-·10^{m}, mediis ·38^{m}-·45^{m} × ·035^{m}-·045^{m}, apicalibus ·55^{m} × ·13^{m}-·15^{m}); venis primariis folii utrinque 15-16; spatha interiore majore (·32^{m}), lignea, profunde sulcata; spadice ·25^{m}-·30^{m}, ramis 2, ·10^{m}-·12^{m}; fl. ♀, corolla extus brevissime setosa, quam calyx 1½-2-plo longiore.

Obs.—In some flowers of this variety there occurred an inner corolla free from and longer than the true corolla; in other flowers there was no trace of this structure. The variety occurs not uncommonly in the forest around Tabatinga, where the ordinary form is also abundant.

26. *B. eumorpha*.—Caudicibus solitariis, vel 2-3 aggregatis 1·2^{m}-1·8^{m} × ·006^{m}·008^{m}, inermibus sed vaginis persistentibus aculeatis obvelatis; foliis ·6^{m} (raro 1^{m}), ad vaginas et petiolos aculeis tenuibus armatis; pinnis 3-4½-jugis oppositis vel alternis, lineari-lanceolatis vel lanceolatis, subfalcato acuminatis supra subtusque glabris, subtus pallidioribus; spatha exteriore fragili, bialata; spatha interiore ·1^{m}-·2^{m} aculeata; spadice simplici vel bifido, pedunculo inermi, pubescente; drupa ovato-globosa, rostellata, ·015-·018^{m} × ·012^{m}-·018^{m}, glabra, purpurea, mesocarpio gossypioideo-pulposo, succulento, endocarpio lenticulari vel depresso-globoso. (Tab. 184, fig. IV.)

Subsp. 1. *eumorpha* (Trail hb. Palm., 100).—Foliis pluribus contemporaneis; pinnis 3 (-3½) jugis oppositis, lato-lanceolatis ·14^{m}-·20^{m} × ·05^{m}-·09^{m}; foliorum vaginis petiolisque aculeis subcompressis ·010^{m}-·035^{m}, spadiceis 2-4-natim aggregatis armatis; spatha interiore

pubescentia badia vestita, et aculeis compressis ·006ᵐ-·012ᵐ, unaquaque basi et apice spadicea, medio pallidiore, valide armata; spadice simplici, rachi ·03ᵐ; fl. ♀, calyce et corolla, quam calyx duplo longiore, coriaceis, cupularibus, ore trilobis, extus lanatis; drupa majore ·018ᵐ × ·018ᵐ, endocarpio subgloboso.

Hab.—In sylvis recentioribus ad ostia fl. Negro abundat.

Subsp. 2. *arundinacea* (Trail hb. Palm., 141, 195, 215).—Foliis paucis contemporaneis; pinnis 3-5-jugis, lineari-lanceolatis, inferioribus ·18ᵐ-·25ᵐ × ·015ᵐ-·025ᵐ, apicalibus ·23ᵐ-·35ᵐ × ·045ᵐ-·075ᵐ; foliorum vaginis et petiolis aculeis tenuibus, subnigris vel unaquaque medio pallidiore, armatis, vel aculeolis horridis; spatha interiore aculeis nigris tenuibus armata; spadicis bifidi, ramis ·025ᵐ; drupa ·015ᵐ × ·012ᵐ; calyce et corolla, quam calyx duplo longiore, glabris?, endocarpio triangulari, lenticulari.

Hab.—Ad Barr. de Cariwacanga, fl. Purus, et ad ostia fl. Taquahi brachii fl. Javary. Ab Indis "Iu-i" appellatur.

Obs. 1.—Though the great similarity that exists between the forms *eumorpha* and *arundinacea* has led me to regard them as subspecies, yet they differ from one another in several important respects, the most important being the division of the spadix, the form of the endocarp, and the envelopes of the fl. ♀, if they prove to be glabrous in *arundinacea*, but on this last point the only specimen I have seen does not permit of certainty.

Obs. 2.—When bearing flowers or fruit *B. eumorpha* can be readily enough distinguished from its congeners, but can hardly be distinguished in the barren state from *B. oligocarpa* and from *B. Juruensis*. It might also be mistaken for *B. tenuis*, Wallace; with the other subspecies of *B. mitis*, Mart., and with *B. cuspidata*, Mart., it could hardly be confounded.

Obs. 3.—To this species I had given the manuscript name *B. gracilis*, with which name the specimens in Kew Herbarium are labelled. I afterwards found that the name had already been used by Dr. Rodriguez, requiring an alteration of the name on my part.

Description of Tab. 184.

I. *Bactris elegans*, Trail.—1. Pinna, nat. size. 2. Spadix and inner spathes, × ½ (the branches of the spadix are cut off about their middle). 3. ♀ flower, enlarged. 4. Fruit, nat. size.

II. *B. hirta*, Mart., subsp. *pulchra*, Trail.—1. Portion of stem showing leaves, spadix, and spathe, × ⅓. 2. Spadix and spathes, nat. size.

III. *B. sphærocarpa*, Trail.—1. Leaf of type-form. 2. Leaf of var. *ensifolia*. 3. Leaf of subsp. *pinnatisecta*, Trail. 4. Spadix with fruits, and spathes, × ⅓. 5. Section of fruit, nat. size.

IV. *B. eumorpha*, Trail.—1. Leaf. 2. Spadix with fruits, and spathes, × ⅓. 3. ♀ flower, enlarged. 4. Section of fruit, nat. size.

V. *B. Constanciæ*, Barb. Rod.—1. ♀ flower, enlarged. 2. Section of fruit, nat. size.

(To be continued.)

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J. Trail del. Mary Suft lith.

Mintern Bros. imp.

I Bactris elegans, *Trail*. II. B. hirta, *subsp.* pulchra, *Trail*
III B. sphærocarpa, *Trail* IV. B. eumorpha. *Trail*.
V. B. Constanciæ. *Barb Rodr.*

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. Holmes, F.L.S.

The following papers were commenced about two years since, with a view to their publication in the form of a supplement to the "Flora of Kent," which is now in course of preparation by Mr. F. J. Hanbury. It was soon found, however, that very little could be done by one or two observers in so large a county; some of the most interesting and fertile districts being farthest from the metropolis, and several of them not easily accessible by rail. It appeared probable therefore that many years must elapse before the Cryptogamic Flora of the county could be thoroughly investigated, unless further assistance were obtained. The most likely means to this end appeared to be the publication in this Journal of the work which has already been done. It is hoped that the Cryptogamic botanists of the county may thus be induced to place on record the results of their own investigations, so that by the time the Phanerogamic Flora is published the Cryptogams may be equally well represented.

In compiling the present list various papers, and the works of such of the older botanists as have enumerated Cryptogams in their writings have been consulted, and a list of them is appended below. Any additional localities from local Floras and other works to which access has not been had will be gladly received by the writer, or by Mr. F. J. Hanbury, F.L.S., Plough Court, Lombard Street, London. As no localities are here given—except those quoted from books—unless a specimen of the plant has been seen by the writer, notices of additional species or localities should be accompanied by a specimen; in the case of the more perishable Fungi, however, a description will be sufficient. It is hoped that in this way an accurate record of the distribution of Cryptogams in the county may be obtained.

It may be useful to point out here some of the districts from which records of Cryptogamic plants have not been received, or which have not been thoroughly worked. The sea-coast from Romney Marsh to Ramsgate, with the exception of the immediate neighbourhood of Lydd, Hythe, Folkestone, Dover, and Deal, has not been thoroughly explored; and the north-eastern coast from Ramsgate to Northfleet has not, so far as I am aware, been examined at all; the coast near Sandgate, and the greensand districts for some distance inland from that town and Hythe, may be expected to yield several species new to the county. The district S.E. of Tunbridge Wells, towards Hythe and Ashford, including much of the Kentish Weald, well deserves investigation, and may be expected to furnish several of the rarer Mosses which have been found in the Weald of Sussex, but not as yet in that of Kent. The range of chalk hills between Charing and Rochester, and the woods around Canterbury, which have been cursorily examined by the writer, gave evidence of being rich in Cryptogams, and are worthy of further examination. The woods around Canterbury have already yielded to other observers many rare Fungi. The records of Cryptogams from the boggy uplands of the county are very meagre. The western border of the county, particularly in the neighbourhood of streams, has already proved to be the richest district for Lichens, and will probably yield many more to those

who have the opportunity of thoroughly exploring this part. The pebbles on the beach at Lydd, particularly near the ponds, are covered with Lichens, but very few of which have yet been recorded. The beach S.W. of Lydd deserves a thorough examination. The list of fresh-water Algæ, including the Diatoms and Desmids, is at present a very small one.

The plan adopted in the following paper may be thus described:—

The higher Cryptogams, including the Ferns and their allies, are omitted, since it is intended to incorporate them, as is usually the practice, with the Phanerogamic Flora; but the Musci, Hepaticæ, Lichens, Fungi, Characeæ, and Algæ, both marine and fresh-water, will be successively treated. Under each species will be given, after the name adopted, the synonyms most frequently in use, as well as those used in the works quoted; the habitat; and a reference to the best figure of the plant in any standard work that can easily be referred to. The localities are arranged in the following order: 1st. Those quoted from published works. 2nd. Those communicated by correspondents (all of which have been certified by the receipt of specimens). 3rd. Those found and examined by the author.

Remarks of a nature not generally found in text-books, but which may be of service to local botanists in searching for species of rare occurrence, are occasionally appended. Species not yet detected in the county, but which should be looked for, are enclosed in square brackets.

The following is a list of the books consulted for localities, with the abbreviations employed in these papers:—

Ray Syn. iii.—Ray, "Synopsis methodica stirpium Britannicarum," 3rd ed., 1724.

Curt. Fl. Lond.—W. Curtis, "Flora Londinensis," 1777-1798.

E.B., Sowerby—"English Botany," 1790-1840, and "Supplement," 1831-1865.

B.G., Turner and Dillwyn—"Botanist's Guide," 1805.

Fl. Met., D. Cooper—"Flora Metropolitana," and "Supplement," 1836-7.

Forster Tonbr.—T. F. Forster, "Flora Tonbridgensis," 1816 and 1842.

Jenner Tunbr.—E. Jenner, "Flora of Tunbridge Wells," 1845.

No notice is taken of plants which, in the Tunbridge Wells Floras, are recorded without definite localities, since it is impossible to say whether they were found in Kent or Sussex.

Musci.

The arrangement of the Mosses here adopted is that followed in late years by the most advanced bryologists in this country,* and considered a more natural one than that given in the "Bryologia Britannica."

The only synonyms quoted besides those from Kentish books are the names employed in the three works on British Mosses most generally in use in this country. These works are thus indicated.

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* A sketch of this arrangement, by Dr. R. Braithwaite, will be found in the "Popular Science Review," 1871.

Wils.—Wilson, "Bryologia Britannica," 1855.
Berk.—Berkeley, "Handbook of British Mosses," 1863.
Hobk.—Hobkirk, "Synopsis of British Mosses," 1873.

Sphagninæ.

SPHAGNUM CYMBIFOLIUM, *Ehrh. S. obtusifolium*, E. B. (Jenner Tunbr.); *S. palustris*, L. (Fl. Metr.).

In large tufts by the sides of streams and on wet places on heaths. July. M. Micr. Journ., 1872, t. 9.

Keston Common; *Fl. Met.*, *George!*

S. PAPILLOSUM, *Lindb.*

In similar situations with the last, with which it sometimes grows intermixed. July. M. Micr. Journ., 1873.

Keston Common; *George!*

Very similar in appearance to the last, and probably often overlooked. It has shorter, more obtuse branchlets, and a more rigid habit; the leaves also are more loosely imbricated.

S. SUBSECUNDUM, *Nees. S. contortum*, β. *subsecundum* (Wils.).

In rather loose tufts in turf bogs and about moorland streams. July. M. Micr. Journ., 1873, t. 9.

Keston Common; *Howse!* Southborough; *Faweett!* In a damp wood near Ightham Woods; Chislehurst Common.

Var. β. *contortum.* S. contortum, *Schultz* (Wils.; Hobk.; Berk.).

In similar situations with the last, but in more watery spots. July. M. Micr. Journ., 1873, t. 4.

Keston Common; *George!*

This species is remarkable for its dark stems and curved cuspidate branchlets. [In the variety δ. *auriculatum*, not yet reported from Kent, the lower part of the stems only is of a dark colour.]

S. SQUARROSUM, *Pers.*

In loose greenish tufts in boggy places near streams and in woods. July. M. Micr. Journ., 1874, t. 67.

Keston Common; *Fl. Met.*! Jacks Wood and elsewhere; *Jenner Tunbr.* Joyden's Wood, near Bexley.

[The variety γ. *teres*, Schimp., which in leaf-structure exactly resembles *S. squarrosum*, but *S. intermedium* in habit, may be distinguished by its red stem and by having the male flowers on shortened obtuse branchlets; it should be looked for in hilly districts.]

S. RIGIDUM, *Schimp.*, var. β. *compactum*, Braithw. *S. compactum*, Brid. (Wils.; Berk.; Hobk.).

In short dense tufts, growing in less watery places than the other species, in bogs and on wet heaths. July. M. Micr. Journ., 1873, t. 37.

Keston Common; *Howse!*

[*S. molle*, β. *Mulleri*, which has long, erect, subulate leaves and numerous very acuminate branchlets, should be looked for near streams on heaths.]

S. INTERMEDIUM, *Hoffm. S. recurvum*, P. Beauv. (Berk.; Hobk.) *S. cuspidatum*, β. *recurvum* (Wils.).

In extensive tufts, usually of a pale green colour, on wet heaths and in bogs. July. M. Micr. Journ., 1875, t. 93.

Keston Common; *Howse!* Ightham Woods!

Easily distinguished from all the other species by the leaves being nearly flat, with their margins wavy when dry, also by the stem having a rigid habit and thick appearance, from the pendent branches being closely appressed.

S. CUSPIDATUM, *Ehrh.*

In very wet bogs or on the margins of pools in woods and on heaths. July. M. Micr. Journ., 1875, t. 92.

Keston Common; *Howse!*

The leaves are singularly narrow and elongated in this species [particularly in the var. *plumosum*, which has not yet been recorded for Kent].

S. ACUTIFOLIUM, *Ehrh.* *S. capillifolium*, Swartz (Forster Tonbr.).

In compact cushions, usually of a more or less reddish tint, the heads smaller than in most other species; in bogs. July. M. Micr. Journ., 1874, t. 57, 58.

Keston Common; *George!*

Var. *rubellum*, Russow. *S. rubellum* (Wils.; Berk.; Hobk.). M. Micr. Journ., 1872, t. 22.

Keston Common; *George!*

Differs from the type only in being dioicous and in having the male flowers in short obtuse branchlets.

S. FIMBRIATUM, *Wils.*

In loose pale green tufts in bogs and marshy hollows. July. M. Micr. Journ., 1874, t. 65.

Keston Common; *Howse!*

Differs from *S. acutifolium* in its pale green colour and very slender stem.

[*S. strictum*, Lindb., which is very similar in habit, but has usually a brownish tint and has broadly truncate stem-leaves, should be looked for.]

S. TENELLUM, *Ehrh.* *S. molluscum*, Bruch. (Wils.; Berk.).

Usually mixed with other species in the drier portions of peat bogs. July. M. Micr. Journ., 1872, t. 19.

Keston Common; *George!*

In this the leaves are very loosely imbricated, by which character, in conjunction with its small size and fragile habit, it is readily distinguished at sight from all other species except *S. laricinum*, Spruce (*S. curvifolium*, Wils. MSS. (Hobk.)), a species which has not yet been recorded from Kent.

The *Sphagna* appear to be less frequent throughout Kent than in many other counties, which is probably due to the fact that most of the upland heaths are remarkably dry. Damp hollows, and pits or ponds in woods appear to be the situations in which they are most likely to be met with.

Bryinæ.

[ANDREÆACEÆ.—None of the species of this family have been noticed in Kent, although *Andreæa rupestris*, L. (*A. petrophila*, Ehrh.?) has been recorded in Forster Tonbr. from the High Rocks in Sussex. These rocks are within 100 yards of the Kentish boundary, and it is just possible therefore that this species may be found on wet sandstone rocks in Kent. The same possibility applies to *Tetrodontium*

Brownianum, B. et S., and *Diphyscium foliosum*, Web. et M., which have been found in Sussex on Eridge Rocks.]

Tetraphidaceæ.

Tetraphis pellucida, *Hedw.* *Mnium minimum non ramosum, angustissimis et pellucidis foliis* (Ray Syn. iii., p. 78, 5).

On sandy soil in woods and heathy places and on decayed stumps of trees. The fruit is rather rare. March to September. Bry. Eur. ii., tab. 196.

Heaths near Woolwich; *Ray Syn. l.c., Fl. Metr.* Penshurst; Abbey Wood, near Plumstead; in fruit in Joydens Wood, near Bexley; and in Ightham Wood.

Polytrichaceæ.

Atrichum undulatum, *P. Beauv.* *Polytrichum undulatum*, Hedw. (Jenner Tunbr.).

Moist, shady banks in woods; common. Winter. Bry. Eur. iv., tab. 410.

Mr. Borrer found some remarkable branched specimens under water in Jacks Wood reservoir; *Jenner Tunbr.* Abbey Wood; Chislehurst; Ightham; Wrotham.

Var. *β. attenuatum*, Wils. Willesboro' Lees, near Ashford.

Pogonatum nanum, *Brid.* *Polytrichum nanum*, Hedw. (Jenner Tunbr.).

Banks in hilly districts. Winter. Bry. Eur. iv., tab. 415.

Ightham.

Very similar in appearance to the next species, but the capsule is shorter, and the columella is cylindrical, not winged.

P. aloides, *Brid.* *Polytrichum aloides*, Hedw. (Fl. Metr.).

On damp banks. Winter. Bry. Eur. iv., tab. 416.

Blackheath; *Fl. Metr.* Ightham.

P. urnigerum, *Brid.* *Poltyrichum urnigerum*, L. H. et T. (Jenner Tunbr.).

On the sides of quarries and similar situations. November. Bry. Eur. iv., tab. 417.

By the side of the large reservoir near Jacks Wood spring; *Jenner Tunbr.* Rusthall Common; near a quarry in Ashover Wood, near Penshurst.

This appears to be less common in Kent than the last two species. Its capsule closely resembles that of *P. aloides*, but the stems are much branched and reddish below.

Polytrichum formosum, *Hedw.* *P. attenuatum*, Smith (Forster Tonbr.).

In woods and heathy shady places. June. Bry. Eur. iv., t. 420.

Sydenham Common; *Sowerby in B. G.* Ashover Wood, near Penshurst.

Easily distinguished from *P. commune* by the absence of perichætial leaves and by the lid of the fruit being longer than in that species. [*P. gracile*, Menz., which grows on damp peaty soil and has a small calyptra, scarcely angular ovate capsule, and no perichætial leaves, should be looked for in Kent.]

P. COMMUNE, *L.*

Woods, heathy places, and hedge-banks; frequent. June. Bry. Eur. iv., t. 425.

Chislehurst.

P. JUNIPERINUM, *Hedw.*

Heaths and dry sandy hilly places; frequent. May, June. Bry. Eur. iv., t. 423.

Tunbridge Wells Common; *Jenner Tunbr.* Bostol Heath; Ightham Wood.

Known from *P. commune* by its shorter stems and the inflexed margins of the leaves.

P. PILIFERUM, *Schreb.*

On dry heathy places; frequent. May, June. Bry. Eur. iv., t. 422.

Tunbridge Wells Common; *Jenner Tunbr.* Ightham Wood.

(To be continued.)

SHORT NOTES.

LAVATERA SYLVESTRIS, *Brot.*, IN THE SCILLY ISLES.—We are indebted to Mr. Curnow, of Penzance, for specimens of this plant, which he believes to be native in the Scilly Isles. He first observed it in July, 1873, when in company with Mr. Ralfs and Mr. Tellam, considering it a distinct-looking variety of *Malva sylvestris*; and in last July he again saw it. On this occasion Mr. Curnow collected specimens, one of which he sent to Mr. H. C. Watson, who determined it to be *L. sylvestris*. On a piece of waste ground near Hugh Town it was abundant, and the discoverer does not feel sure whether the plant does not generally take the place of *Malva sylvestris*, or, indeed, whether the latter occurs in the islands at all. This, however, is a point which examination next season will readily determine. In Mr. Townsend's list (Journ. Bot., 1864, p. 108) *M. sylvestris* is given as "common." *Lavatera sylvestris*, Brot. was first fully described in 1827 in Brotero's "Phytographia Lusitaniæ" (vol. ii., p. 225), where it is also well figured (tab. 179). A full description will also be found in Lowe's "Manual Flora of Madeira" (vol. i., p. 64). The plant is common throughout Portugal, abundant in Madeira, and grows also in Spain, S.W. France, the Azores, and Mogador, thus showing decided "Atlantic" tendencies. Whether it is specifically distinct from the common and widely-spread Mediterranean species *M. cretica*, L., with which many botanists combine it, is a matter for further examination. So also is the determination of the conditions under which it occurs in Scilly, whether introduced or native; the latter is not improbable, but it will be advisable to investigate the point specially next summer, and this Mr. Curnow intends to do. The first-sight resemblance of the two plants, *Malva* and *Lavatera sylvestris*, is so close that they would be by most persons readily confounded; it will be therefore well worth while to pay special attention to the common Mallow in the West of England and Ireland. A ready means of discrimination lies in the epicalyx, the three leaves of which are free in *Malva* and united at the base in *Lavatera*; that is, the epicalyx is deeply tripartite in the latter, but distinctly three-leaved in *Malva*.—HENRY TRIMEN.

Extracts and Abstracts.

Development of Scleroderma.

Développement du Scleroderma verrucosum. Par M. Nicolas Sorokine. ("Annales des Sciences Naturelles," 1876, p. 30.)—Attention is first directed to the two states, thread-like and lash-like, of the mycelium, upon which no organs of fecundation were discovered. In a very early state the mycelium consists of a cushion of short interlaced dichotomous filaments, which afterwards become still more interlaced, so that it has somewhat of a spongy structure consisting of masses of interlacing fibres with frequent cavities. Fine branches are now given off from the filaments which direct themselves into the nearest cavity, and when there bifurcate at their extremity, one of the bifurcations twining round its fellow; this is the commencement of the hymenium, which increases quickly by the formation of other filaments from the original one, and the young plantule now consists of a great number of hymenial masses contained in a darker-coloured common envelope, the intervals between the former being occupied by filaments which give origin to the capillitium. The filaments of the capillitium become transversely partitioned, and some of the segments are thickened, while others remain thin and transparent, and during the time the spores are ripening the latter are converted into mucilage, the simple or branched thickened segments remaining. The origin of the basidia is as follows:—immediately after the development of the hymenial masses, some of the filaments of which they are composed bear branches which direct themselves towards the centre of the mass; these branches divide transversely, and the terminal cell becomes elongated and is soon seen to carry four round pedicellate spores, the nucleus of the basidium disappearing before the spores make their appearance, as Woronine has already observed in *Exobasidium*. M. Sorokine cannot share the opinion of Berkeley and Tulasne that the spores do not arrive at their full development while attached to the basidia, but that they fall off and draw elements of nutrition from the nidus in which, when free, they find themselves. On the contrary, he thinks that the spores do not fall until their development is complete. He believes also that, contrary to what has already been held, there is no regularity in the order of local maturation of the hymenial masses. The so-called "nucleus" of the spores is shown to be of oleaginous nature, since it dissolves in alcohol.

A New Genus of Myxomycetes.

Bursulla crystallina, nouveau genre de Myxomycétes. Par M. Nicolas Sorokine. ("Annales des Sciences Naturelles," 1876, p. 40.)—This organism consists of a pedicel of variable length, on which is borne a cell ·015mm. in height, with reddish contents, amidst which are seen darker-coloured specks and oleaginous droplets. After a time the plasma becomes separated from the cell-wall, and divides into eight masses which gradually assume a spherical shape. By crushing a cell in which division is in progress it is seen that here is no free-cell formation, but a simple division of the protoplasm. After

the assumption of the spherical form, the margin of the masses changes its contour, and moves at first slowly but afterwards more quickly in the interior of the cell. While this is going on the top of the cell is transformed into mucilage, which finally disappears, so that we have now a sort of purse (sporange) filled with eight mobile plasmatic masses; these latter escape one by one and push out long pseudopodia, and being devoid of a nucleus they must be regarded as true *Monera*. About two hours after the commencement of motion the moneroid spores lose some of their energy and several now come into contact, and blending form a plasmodium. Afterwards elevations, whose number depends on the size of the plasmodium from which they are derived, are seen to rise up from its surface; these become more and more prominent owing to the rest of the plasma pressing into them, until the adult pedicellate spherical cell is arrived at. Sometimes, during the prevalence of cold weather, the plasmatic bodies are nucleated; but all the stages of development of this nucleated form are precisely similar to those of the non-nucleated, the amœboid bodies blending and producing cells with amœboid contents. When an amœboid spore comes in contact with a moneroid one the two blend and form a sphere which ultimately becomes covered by a thick membrane, and shows a very clearly-defined nucleus; this oospore remains at rest throughout the winter and germinates in the spring.

The author compares his genus with *Guttulina* of Cienkowsky, from which it differs only by the presence of a cell-membrane and the absence of a nucleus to the spores, the amœboid state showing a transitional condition. The view of Sachs, who sees in the blending of the spores a true sexual act, are regarded with favour. *Bursulla* is found on horse-dung.

Development of Aphanomyces.

Développement de l'Aphanomyces stellatus. Par M. Nicolas Sorokine. ("Annales des Sciences Naturelles," 1876, p. 46.)—*Aphanomyces stellatus* consists of a branched cell containing a granular plasma. Two sorts of fructification have hitherto been known; non-sexual mobile spores and ordinary Saprolegnious oospores resulting from an act of fecundation. In the formation of the mobile spores the contents of a filament become grouped longitudinally into from twenty to 100 rounded masses; the filament is now shut off by means of a transverse partition from the rest of the cell, and after a time it bursts at the extremity, the spores escaping one by one and fixing themselves at the mouth of the opening. The membrane surrounding each spore then bursts and a biciliated zoospore is set free from each of them, the empty spore-membranes remaining massed together at the opening.

De Bary has remarked that, as sometimes occurs in *Achlya prolifera*, the spores occasionally germinate at the mouth of the filament without the setting free of a zoospore. M. Sorokine observes that sometimes several of the lower plasmatic masses remain fusiform, and after a few agitations come to rest *in loco*. Sometimes, when almost all the mobile spores have escaped to the opening at the top of

the reproductive filament, the few remaining are surprised in position and germinate there, a new opening in the side of the filament being formed for each developing spore. Again, from the mobile spores plasmatic bodies devoid of cilia may be developed. Sometimes filaments are met with having a diameter four or five times greater than usual; these are found to be filled with membranes abandoned by the developing spores, and at first sight they do not differ from the sporangia of *Dyctyuctus* and of *Diplanes*. This condition, moreover, has been shown by Pringsheim to occur occasionally in *Achlya racemosa*.

M. Sorokine has found on this plant similar organs of reproduction to those discovered by Walz in *Saprolegnia*. Certain of the filaments, instead of producing sporangia or antheridia and oogonia, bear a terminal spherical mass with smaller ones below; these conidia are detached one by one and germinate.

Artificial Production of a Protonema on the Sporogonium of Mosses.

Über künstlich hervorgerufene Protonema bildung an dem Sporogonium der Laubmoose. Von E. Stahl. ("Botanische Zeitung," Nov., 1876.)—Our knowledge of the generally interesting subject of the alternation of generations has been recently increased by the publication by Pringsheim of the results of a series of experiments on the formation of the protonema in Mosses. The researches of Dr. Stahl are not only entirely confirmatory of these results, but in several points tend to advance them.

The well-known observations of Farlow* on the development of the leaf- and spore-bearing (asexual) generation of Ferns from a prothallium barren of archegonia (as in *Pteris cretica*) formed the first exception to the rule that this generation owed its origin to sexuality. This discovery, however, only proves that we have to do with a rule admitting of exceptions, and in no way alters our previous views on the alternation of generations in Ferns. Brefeld, on the other hand, in his "Entwickelungsgeschichte der Basidiomyceten," leaving the discovery of Farlow entirely out of consideration, lays down the axiom, that "the sexual cells on the one side and the spores on the other are the turning-points in the sexual and the sexually-produced but asexual chapters in the life of a plant." Though the above law no longer holds good without exception as regards the higher spore-producing plants, as to which it was laid down, Brefeld wishes to employ it as a test for the question, whether the fructification appearing in the course of the development of a cellular plant is or is not the product of sexuality, and he instituted various experiments with a view to deciding this in the case of the *Basidiomycetes* and *Ascomycetes*. Conclusions in favour of its not being so were obtained from numerous experiments.

In the course of many investigations, extending over a considerable time, Dr. Stahl was, on the other hand, convinced of the sexuality of the Lichens, which he considers undoubtedly to belong to the Ascomy-

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* See Journ. Bot., 1874, p. 185.

cetes, the sexual reproduction of which both Brefeld and Van Tieghem so strenuously deny, the former observer finding a distinct proof of his theory in the circumstance that the Hyphæ on being cultivated in a nutritious solution produced germinating mycelial filaments without forming Asci.

As Brefeld's views on the alternation of generations of the Ascomycetes take the relations existing in Vascular Cryptogams as a point of departure, it was first of all the question whether the production of the sexual generation was necessarily bound up with the formation of spores, or whether perhaps, under normal conditions, other parts of the spore-bearing plant were not in a position to produce the sexual plant. To settle this question by experiment no better object could be found than the sporogonium of Mosses, and after much searching Dr. Stahl found that of *Ceratodon purpureus* to be the most suitable for conducting the necessary investigations.

The experiments were instituted thus. The sporogonia were partly extracted from their mother-plants—a process which can usually be effected without injury—and partly cut off directly above the point of their connection; all were placed on damp earth under a bell-jar, and exposed to diffused daylight. Not a few soon showed clear signs of decay; others again remained green and unaltered in shape, with the exception of some deformations of the capsule. After two or three months, however, dense protonema-formations, on which leaf-bearing Moss-plants were already formed, proceeding from the cut surface of the seta, extended over the earthy substratum. From microscopic examination it appeared that the protonema-threads owed their origin to the chlorophyll-containing cells within the seta, longitudinal sections of which showed the way they arise. After a lapse of three months the contents of most of the seta-cells had died in both the forms of cultivation, but here and there were found, extending along the whole length of the seta, between the dead thin-walled cells of the fundamental tissue, cells which not only retained their protoplasm and chlorophyll, but had increased the volume of the latter in particular in a striking degree. These occurred in the decayed tissue, sometimes isolated and sometimes in groups, the individual cells arranged beside or above each other. Even from cells in the wall of the capsule Dr. Stahl found protonema filaments to proceed.

From Pringsheim's observations, as well as from those here communicated, the conclusion is clearly arrived at that the transition from the spore-bearing generation to the sexual generation is not necessarily bound up with the formation of spores, but that, under conditions injurious to the formation of spores, different cells, both of the seta and the capsule, are capable of producing a protonema. With this the argument of Brefeld, deduced from his experiments, against the theory of the sexuality of the Ascomycetes falls to the ground. The circumstance that the Hyphæ cultivated in a nutritious solution again produced germinating mycelial filaments without forming Asci is no proof against the sexuality of the Ascomycetes; as little would the non-appearance of these filaments justify regarding the Hyphæ in question as produced sexually.

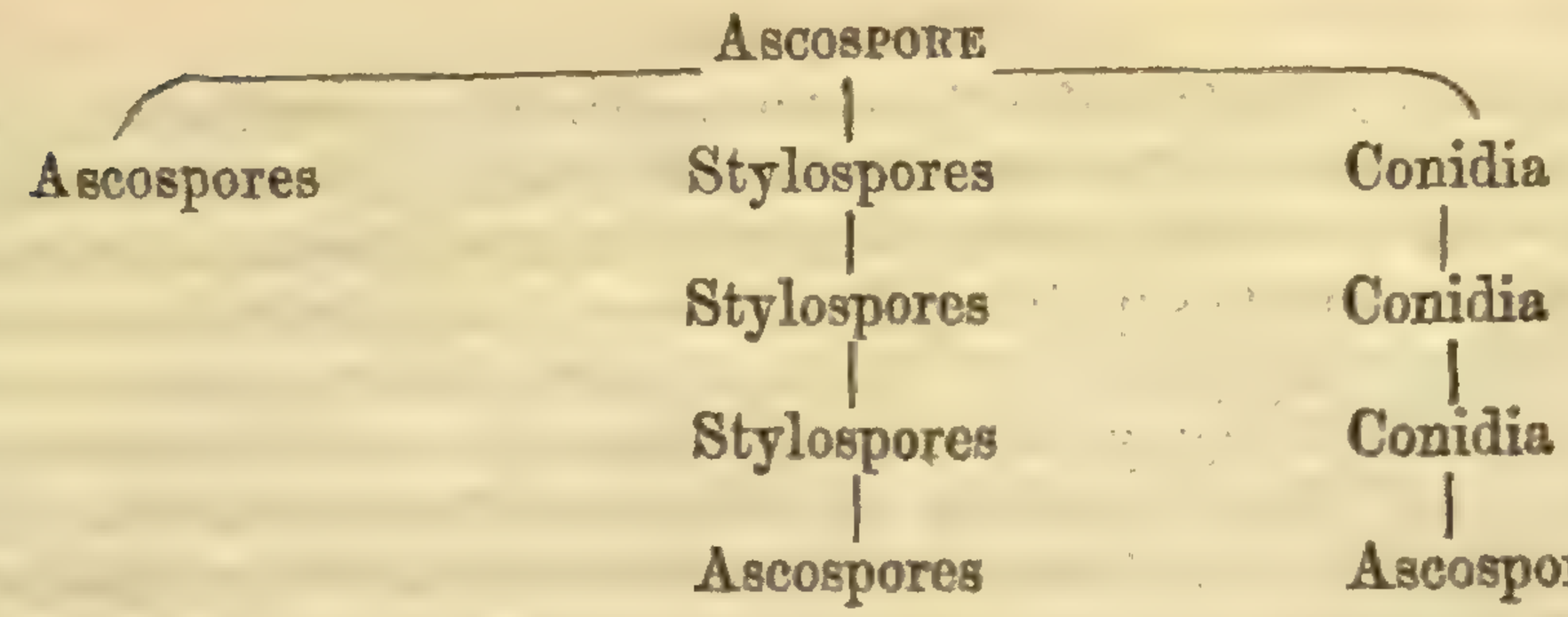
The experiments of Dr. Stahl were performed last spring in the Strasburg Botanical Laboratory. G R. M. M.

On Pycnidia.

Beiträge zur Kenntniss der Pycniden von Dr. Hermann Bauke. (Nova Acta. Band xxxviii.) Dresden. 1876.—Pycnidia are found throughout the whole year on or in most dead vegetable matter, and not infrequently also on other substrata supplying the necessary nourishment, such as old palings, damp, slimy mould, &c. As a rule, they do not occur alone, but in company with Ascomycetes, and in particular with *Cucurbitarieæ*, *Pleosporeæ*, and *Massarieæ* of the subdivision of Pyrenomycetes. Much more rarely they are found with Discomycetous forms. Before the time of Tulasne these Pycnidia, as well as Spermogonia and Conidia, were looked upon as Fungi complete in themselves, and according to this idea the genera *Phoma*, *Diplodia*, *Sphæropsis*, *Cytispora*, and others were formed; but Tulasne, judging from the circumstance that Pycnidia were often found on the same mycelium as the Perithecia, advanced the theory that they were organs normally belonging to Fungi of the group of Ascomycetes. The accuracy of this view was rendered doubtful by Prof. de Bary's work on *Cincinnobolus*. Of the fact that *Cincinnobolus* grew upon the mycelium of *Erysiphe* there appeared to be no doubt; but Prof. de Bary showed that it was not a case of *Cincinnobolus* being an organ of *Erysiphe*, but one of parasitism. Whether the same held good as regards Pycnidia generally was still a matter of doubt, and the only means of settling it was to raise Pycnidia from an Ascospore, or Perithecia from a Stylospore, and to effect this was the chief aim of Dr. Bauke's researches. To this end the only certain means was that of isolated cultivation, and the different steps and methods employed, accounts of which are given in detail, are the result of careful forethought and experienced practical knowledge.

The author thus sums up his results:—"As to the question whether the Pycnidia are independent organisms, or whether they belong to the Ascomycetes, these researches prove the second of these alternatives to be correct. The cultivation of the Ascospores of *Pleospora polytricha*, *Cucurbitaria elongata*, and *Leptosphæria* (*Pleospora*) *Doliolum* regularly yielded Pycnidia—in the first of the three species named such bodies were up till now unknown; in this case the direct connection between the sown Ascopores and the Pycnidia was each time established. From *Pleospora herbarum*, in spite of numerous cultivations instituted for the purpose of studying specially the development of the Perithecia and the Pleomorphism of this Fungus, I obtained only twice Pycnidia. . . . In the cultivation of *Melanomma* (*Sphæria*) *Pulvis-Pyrius* and of *Pleospora pellita* a dense mycelium was regularly produced, on which in the latter species the Conidia drawn by Tulasne appeared in masses, but no Pycnidia, which were indeed never found on either," &c. From *Cucurbitaria Laburni* and *Pleospora Clematidis* the same results were obtained, namely, no Pycnidia. Pycnidia appear as parasites on other Ascomycetes (as in the case of *Cincinnobolus* and *Erysiphe*) only as distinct exceptions.

The fact also deserves mention that in the great number of experiments recorded, Stylospores, almost without an exception, produced Stylospores, and Conidia, Conidia; but the following table illustrates the succession of generations more concisely than any detailed description would:—



In the course of these exhaustive researches, conducted in the laboratory of Professor de Bary, of Strasburg, Dr. Bauke investigated the life-history of ten different Pycnidia, which according to their structure, he divides into simple and compound. To the first of these types belong the Pycnidia of *Cucurbitaria elongata*, *Leptosphæria Doliolum*, and *Pleospora herbarum* (?) As the representative of the second may be named a Pycnidium living in the bark of *Cornus sanguinea*, with brown stylospores consisting of two cells. The Pycnidia of *Pleospora polytricha* occupy a position intermediate between these two chief types.

The memoir is accompanied by six plates, which fairly illustrate the different phases in the life of Pycnidia.

G. R. M. M.

GEOGRAPHICAL STATISTICS OF THE EXTRA-BRITISH EUROPEAN FLORA.

By Thomas Comber.

(From the "Transactions of the Historic Society of Lancashire and Cheshire," 1875, pp. 13-32. Read 4th March, 1875.)

I. Introduction.—In a paper read before your Society in January, 1874,* wherein certain questions respecting the dispersion of plants were discussed, by means of the average specific areas of species indigenous to Britain, I pointed out that, as the investigation had been limited to the flora of a single country, the results arrived at could not be regarded as at all conclusive. However suggestive they might be, they required, in so far as they differed from the conclusions of Prof. Alph. De Candolle and others, or opened out fresh questions, to be confirmed by comparison with the results of similar investigations on the floras of other countries. With a view of ascertaining whether they would be thus confirmed, I have been led to treat the *extra*-British European, or, as I shall term it hereafter for brevity, the Continental flora, in the same manner as the British species were treated in my previous paper.

The first step in the investigation was to settle a list of species; and I have adopted as a groundwork Nyman's "Sylloge," with its supplement; rejecting therefrom (*a*) doubtful or disputed species, such

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* See Journ. Bot., 1874, p. 248.

as the numerous forms that have been ranked as species by M Jordan, but are not generally recognised by other botanists; and (*b*) new or recently described species, regarding as such all published since 1850, for the geographical distribution of these can be only very imperfectly known. Thus reduced, Nyman's lists, which contain altogether over 10,000 names, are brought down to 7768 species, and further, deducting those that are native in Britain, or are sub-species of British super-species, we have remaining 6617 Continental species.

The geographical distribution of these had next to be analysed, on much the same principle as that of British species was in a paper read before your Society in 1873;* but the extension of the flora brought into consideration rendered some modification necessary. For British plants, according to latitude and elevation, four *zones* were proposed, viz., the Arctic, Northern, Temperate, and Southern; but, as a far larger proportion of Continental species comes under the Southern zone, it is necessary to subdivide this into three sections, viz.—1, *Upper* (the only one represented in Britain), comprising those Southern plants which range northward beyond the limit of vineyard cultivation; 2, *Middle*, composed of plants stretching northward beyond the limit of olive cultivation, but not beyond the vineyard boundary; and 3, *Lower* or *Mediterranean*, containing species confined within the region of olive cultivation. We have thus three lines of demarcation, the polar limits of cereal cultivation, of vineyard cultivation, and of olive cultivation. Zone 1, *Arctic*, finds its lower limit in the cereal line; zone 2, *Northern*, its lower limit in the vineyard line; zone 3, *Temperate*, ranges both above the cereal line and below the vineyard line; while of zone 4, *Southern*, the upper section has its upper limit in the cereal line, the middle section its upper limit in the vineyard line, and the lower section its upper limit in the olive line.

In determining under which zone a plant should properly be placed, *altitude* is of equal importance with latitude, as is evident from the reappearance of most high Arctic species on lofty mountains much further south. They are there accompanied by other plants whose range on the mountains agrees exactly with their own, both growing only at high elevations, and not descending into the agrarian region; but these Alpine plants have not yet been met with in the extreme Northern latitudes to which Arctic plants extend. In the British flora there are only two or three such Alpine plants, for a species that reaches as far as Britain usually stretches further north to the Arctic regions. These British Alpine forms, notwithstanding their range only southward from Britain, were classed as Arctic plants, for it was not worth while to separate so small a number as a distinct group; but in the Alps and other mountain regions of Southern Europe the number of Alpine plants increases so greatly as to exceed that of Arctic species, and it therefore becomes necessary to split up the Arctic zone into three divisions—1, *Arctic* (restricted), for plants found only in the extreme north; 2, *Arctic-Alpine*, for those found on the mountains

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* See Journ. Bot., 1874, p. 84.

further south, as well as in high latitudes; and 3, *Alpine*, for those found only upon the mountains. Before leaving this subject I may mention that some species, such as *Veronica macrostemon* and *Castilleja pallida*, are in Europe strictly Arctic, but occur on the Himalayas or the Rocky Mountains; and *vice versa* other species, such as *Gentiana frigida* and *G. prostrata*, are strictly Alpine in Europe, but have been found in Arctic Asia or America.

Northern plants also generally recur on mountains further south, where they range downward lower than Arctic plants, and descend more or less into the agrarian region, but do not reach the vineyards. With a like lower limit of level there are found on the hills numerous Sub-alpine or Montane plants which do not grow in the North. We must therefore divide the Northern zone also into three parts—1, *Northern* (restricted); 2, *Northern-montane;* and 3, *Montane* only.

Again, we find plants southern as regards latitude, but with a great range of elevation, which thus bear the same relation to Temperate plants that Alpine do to Arctic, or Montane to Northern. Their occurrence within the vineyard region, or at times even within the olive region, forbids their being considered Montane, while their ascent above the line of cereal cultivation on the mountains prevents our placing them in the Southern zone. These I have classed with Temperate plants, distinguishing, them however, as "southern in latitude." As an example, I may refer to *Astrocarpus sesamoides*, which occurs only in Southern Europe, but there ranges from the hot plains almost to the snow-line.

Continental plants require, with reference to longitude also, a somewhat more elaborate classification than British plants. Those British plants which have the most limited area are necessarily confined to Western Europe, and the occurrence of a British species in Eastern Europe implies a more extended range; but in the Continental flora this is not the case, for species of very limited area may grow only in the east. I have therefore found myself obliged to adopt, with regard to range east and west within Europe itself, the following six subdivisions—1, Confined to Western Europe; 2, to Central; 3, to Eastern; 4, extending to West and Central; 5, to East and Central; and 6, to all three sections of the Continent.

With respect to range eastward into Asia, the same subdivisions are adopted for Continental as were for British plants, according to their extension—1, to Western Asia, or as far as the Altai Mountains in Siberia; 2, to India, or as far as the Baikal range in Siberia; 3, to Eastern Asia.

We have next plants found in Europe and America, but not recorded from Asia; and, finally, species which extend to all three Continents. These last, which in the paper on British plants were termed "Universal," may be subdivided into two sections, according as they (1) are confined to the Northern hemisphere; or (2) cross the Tropics, and are found in the Southern hemisphere as well.

The accompanying table shows at one view the result of an analysis of the Continental flora, dividing it in one direction longitudinally, in the other latitudinally and altitudinally, as above detailed :—

ZONE.	EUROPE (ONLY).						EUROPE AND ASIA									EUROPE AND AMERICA.	UNIVERSAL.		TOTAL.
	CONFINED TO			EXTENDING TO			WESTERN ASIA TO			CENTRAL ASIA TO			EASTERN ASIA TO						
	Western.	Central.	Eastern.	West. and Cent.	East. and Cent.	All 3 Sections.	East. Europe.	Centr. Europe.	West. Europe.	East. Europe.	Centr. Europe.	West. Europe.	East. Europe.	Centr. Europe.	West. Europe.		N. Hemisphere.	S. Hemisphere.	
Arctic (restricted)	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	2	20	..	23
Arctic-Alpine	..	1	..	..	3	1	3	2	1	2	..	..	3	6	3	4	69	3	101
Alpine	68	77	71	23	67	49	17	8	13	..	1	1	1	3	3	2	..	..	404
Northern (restricted)	2	19	2	2	6	..	1	1	..	1	3	..	5	5	..	5	11	..	63
Northern-Montane	..	4	1	..	6	7	2	2	7	..	..	..	5	7	13	3	41	1	99
Montane	166	89	103	54	80	138	43	17	44	2	1	6	5	2	7	..	3	..	760
Temperate	..	..	..	..	2	19	..	3	67	..	..	40	7	4	47	4	42	12	247
Do. (S. Latitude)	27	..	2	17	2	85	18	6	44	1	1	9	2	2	2	..	..	..	168
Southern (Upper Section)	14	4	15	17	14	96	41	22	205	11	3	66	17	3	38	2	10	15	593
Do. (Middle do.)	44	35	225	29	80	116	260	47	231	35	2	38	29	7	8	3	4	5	1198
Do. (Lower do.)	723	494	522	198	125	268	165	75	328	7	4	27	3	2	4	..	6	10	2961
TOTAL	1044	723	941	340	385	729	550	183	940	59	15	187	78	41	125	25	206	46	6617

It will be seen that by far the largest number of species falls into the lower or Mediterranean section of the Southern zone, and that a very much smaller proportion extends across the Atlantic than was the case with British plants.

(To be continued.)

Notices of Books.

Beobachtüngen an dürchwachsenen Fichtenzapfen. Ein Beitrag zür Morphologie der Nadelhoelzer, von Dr. G. Stenzel. Mit 4 lithographischen Tafeln. Dresden, 1876. (Nova Acta der K. Leop.-Carol. Deuts. Akad. der Naturf., band xxxviii., nr. 3.)

Dr. Stenzel observed in the Riesengebirge, in the summer of 1865, several abnormal cones on a tree of *Picea excelsa*, Lk. On examination these cones were found to have the axis prolonged at the apex into a short shoot, bearing regularly-formed needle-like foliage-leaves. The scales of the cone were for the most part quite regular, while others were curiously contorted and more or less coherent. Further examination showed the most unmistakable transition forms between the needle-like foliage-leaves and the bracts of the cone in these monstrous specimens, thus rendering the homology of these parts in the Spruce-Fir no longer questionable. In tracing the transitional forms, there are to be met with at one end the needle-like leaves of normal form; then succeed others that are shorter and broader. The next leaves are still elongated, but rather unequally tetragonous, dark green in colour, and of thicker tissue. Succeeding these come shorter leaves, more pointed, and of an elongated triangular form, flattened in the centre, but having a slightly prominent rib on the back. In these last the margin becomes irregular from indications of notching, but the needle is still green and sharply separated from the cushion-like basal part of the leaf. The separation of leaf and cushion becomes gradually less apparent, and then disappears entirely, the needle now being flat, thin, and at length scaly, the margin being irregularly-toothed, and the green colour replaced by a pale brown. The cushion-like structures on which the needles are placed are, according to Stenzel, to be regarded, not as portions of the stem, but as basal parts of the leaves, the separation of the needle being due to the formation of a special cicatricial zone in the leaf itself, and not between stem and leaf. In this character there is a resemblance between the leaves of Ferns and those of the Spruce. The axillary buds are also formed in the axil of the cushion, and not at the line of separation of the needle from the cushion, examples illustrating this being figured by Stenzel. The needle and its cushion may thus be compared to the lamina and sheath of a leaf or lamina and petiole, the separation taking place between the short sheath or petiole and the blade.

Monstrous male flowers were also examined which exhibited all intermediate stages between needle-like foliage-leaves and stamens. The stalk-like structure supporting the pollen-sacs is the basal portion of the leaf or cushion, while the upper part represents the modified needle, the pollen-sacs being produced on the under-surface. Several figures are given by Stenzel to illustrate the nature of the stamens.

Androgynous cones similar to those already described by Prof. Alexander Dickson in the "Transactions of the Botanical Society of Edinburgh" are also figured. In some of the cones Stenzel noticed that frequently the smaller or larger scales had bracts below them showing the most varied modifications of stamens. Sometimes they had a large, broad base, at other times a very narrow one. The appearance of the extremely minute modified stamens figured is sufficiently peculiar.

Stenzel next proceeds to describe the scales of the monstrous Spruce cones, and attempts to clear up the true nature of the *squama fructifera*, and at the same time to solve the vexed question of the gymnospermous nature of the *Abietineæ*. Very many monstrous cones were examined, some with very few green leaves, others with a large number. In one monstrous cone figured, with only a small tuft of green leaves at tip, bracts were noticed near the apex, with buds developed in their axils. The two lateral bud-scales of the axillary bud are well developed, hard, brown, with the margin irregular and quite of the texture of the scales of the cone. By further tracing these abnormal buds, it is found that at last all trace of the bud except the two lateral bud-scales disappears, and these become soldered together more or less completely. The two scales are united posteriorly. Further down, the scales show no trace of a suture, and pass into the ordinary bifid scales of the cone. Stenzel thus concludes that the scale is formed by the union of two scale-leaves belonging to an abortive bud developed in the axil of the bract, a view already brought forward by Alexander Braun and Caspary. Stenzel holds that these scale-leaves are united by their posterior margins, so that their under-surfaces are placed superiorly, the ovules thus springing from the back of the scale. It will be seen that Stenzel combats the view advanced by Strasburger, that the scale is a form of aril.

The paper is a mass of details quite inexplicable without the figures. The general conclusions come to by the author of the paper are that the fruit-scale of the Spruce, and also of the other true *Abietineæ*, consists of the two first leaves of a suppressed bud developed in the axil of the bract. These leaves are so placed that their posterior margins are united, and their anterior margins directed outwards. Lastly, the ovule is developed on the back of the carpel in the same way that the pollen-sacs are developed on the back of the staminal leaves in the Spruce. On the whole, we cannot consider that Dr. Stenzel has thrown much light on the vexed question of the gymnospermy of Conifers.

W. R. McNab.

Proceedings of Societies.

Linnean Society, *Nov.* 16*th*, 1876.—Prof. Allman, President, in the chair. The only botanical paper read was "On the Flora of Marion Island," by H. N. Moseley, of H.M.S. *Challenger*. The Cryptogamic botany of this island, and indeed all those of the South Atlantic and Indian Oceans visited by the Expedition, has to a great extent been already worked out by specialists in the various departments from materials sent home to England, and published in the Journal of the Linnean Society. Mr. Moseley's paper, therefore, deals

not so much with the constituents of the flora, as a collective field view of the vegetation of the island. He notices its peculiar isolation, and with regard to the influences of Antarctic Drift, &c., suggests that the combined action of the winds and waves doubtless may have contributed to bring about the diffusion of Fuegian and Falkland Island plants, but that possibly the birds of wide wandering habits may likewise have contributed to its flora by transportation of seeds. The volcanic nature of the island, oceanic moisture, temperature, and snow-clad mountain summits are also important factors with reference to its flora. Below the snow line are patches of green intermingled here and there with yellow spots. These latter are due to Mosses. The rocks at half-tide are covered with *Durvillea utilis*, above high tide *Tillæa moschata* is found in abundance, and beyond the beach a swampy, peaty soil covers the rocks, where a thick growth of herbage grows, principally composed of *Acæna ascendens*, *Azorella Selago*, and *Festuca Cookii*; the former of these three being the most abundant plant in the island, though the latter Grass is by no means scarce. *Ranunculus biternatus*, *Callitriche antarctica*, and *Stellaria media* are met with at waterpools, chiefly near the sea. *Pringlea antiscorbutica* seems less profuse than at Kerguelen Island. Of Ferns, *Lomaria alpina*, *Aspidium mohrioides*, *Polypodium australe*, and *Hymenophyllum tunbridgense* are fairly represented, the former being most conspicuous. While Mosses are in plenty, Lichens are sparse. The limit of vegetation is supposed to be at about an altitude of 2000 feet. From the occurrence of *Pringlea* on Marion Island, the Crozets, and Kerguelen Island, and the existence of fossil tree-trunks in the two latter, the author surmises an ancient land-connection between them. Mr. Moseley afterwards called the attention of the Society to a series of botanical specimens from definite localities or limited areas arranged together on cardboards. Specimens of the entire floras of Marion Island, Juan Fernandez, Kerguelen Island, Tristan D'Acunha, and such-like insular groups were thus combined; by this means a distinct comprehension of the vegetation of the districts is obtained at a glance. With reference to these one of the speakers recalled the fact that the late Mr. Ward had adopted a similar plan to illustrate the local flora of English districts, and it was suggested this method had its uses in an educational point of view.

Dec. 7th, 1876.—G. Bentham, V.P., in the chair. The following papers were read:—"Systema Iridacearum," by J. G. Baker. In his introduction to this memoir the author stated we now know in the Order about 700 species, and sixty-five well-marked genera. Nearly all the *Iridaceæ* inhabit temperate regions, and may be grown successfully in the open air in this country. Some are among our most familiar garden genera, *e.g.*, *Gladiolus*, *Crocus*, and *Iris*. During the first thirty years of the century it was studied diligently in England, and a large number of species were introduced into cultivation, and were figured and described in the "Botanical Magazine." In 1805 Gawler, afterwards Bellenden Ker, published a synopsis of genera with a list of all the species then known, many of the genera as now admitted being then for the first time characterised. Afterwards, in 1827, he issued his book the "Synopsis Irideærum," wherein full descriptions of 30 genera and all the known species were

given. Dietrich, Salisbury, Herbert, Klatt and others have only very partially studied the Order; but now (1876), after half a century, with additional material, the author retreads the ground gone over by Ker. Adopting the plan followed in his papers in the Society's Journal on the *Liliaceæ*, remarks regarding the sexual organs are first given. The perianth presents three distinct structural types, and these furnish the author's primary subdivisions of the Order:—1. A regular perianth with a straight tube and symmetrical limbs in which all the six divisions are alike in shape and direction, correlated with symmetrical stamens spreading from the axis in the same direction as the perianth-segments which they subtend. Examples, *Crocus*, *Ixia*. 2. A regular perianth with stamens as in the last type, but the three inner segments are decidedly different in shape and often in direction to the three outer. Examples, *Iris*, *Tigridia*. 3. An irregular perianth, with a more or less decidedly arching tube and segments of the same row different in shape and direction, correlated with stamens unilateral and arching in the expanded flower. Examples, *Gladiolus*, *Antholyza*. Three series thus arise: the *Ixieæ*, *Irideæ*, and *Gladioleæ*. The first contains 32, the second 20, and the third 13 genera. A somewhat corresponding tertiary parallelism of their types of inflorescence exist. As secondary characters one section contains plants having bulbs and free stamens; the *Ixieæ* has 15 genera of these, the *Irideæ* 8, and the *Gladioleæ* 13. Another section has bulbs and monadelphous stamens, whereof 6 genera belong to the *Ixieæ*, 6 to the *Irideæ*, but none to the *Gladioleæ*. A third section is distinguished by absence of bulbs, but has free stamens; 8 genera of these come under the *Ixieæ*, 4 under *Irideæ*, and none under *Gladioleæ*. Fourth, and lastly, are those without bulbs, but with monadelphous stamens; to the *Ixieæ* belong 3 genera of these, to the *Irideæ* 2, and to the *Gladioleæ* none. Of species the *Ixieæ* possesses a total of 289, the *Irideæ* 215, and the *Gladioleæ* 194. Unlike the *Liliaceæ* and *Amaryllidaceæ*, *Iridaceæ* is one of the most strictly limited of Natural Orders, *Campynema*, with inferior ovary, 6 stamens with extrorse anthers, melanthoid leaves, and a tuft of fleshy root-fibres, being the only genus of doubtful character. R. Brown placed it in *Melanthaceæ*, Müller, in *Hypoxidaceæ*, whilst Bentham looks upon it as an anomalous Irid. The order shows two leading types of inflorescence—the first a centripetal spike, in which the spathe is always two-valved and one-flowered, and the flower is sessile inside it, and comparatively persistent; and, secondly, a centrifugal cyme congested into a cluster, the outer bracts of which are firm and green, and the inner ones membranous, the flowers being more fugitive, and pushed up one by one in succession to expand outside the cluster of bracts. Taking the primary subdivisions as founded on perianth structure, all the Gladioleæ show the first, and all the Irideæ the second type of inflorescence, whilst in the Ixieæ both are represented. In discussing the geographical distribution of the genera, Mr. Baker tabulates the evidence, the result yielding: to Europe and N. Africa, 94; temperate Asia, 89; temperate N. America, 25; tropical Africa, 56, upwards of thirty novelties which are still undescribed having been found by the late Dr. Welwitsch in Angola; tropical Asia and Polynesia, 1; tropical America, 82; Cape of

Good Hope, 312; Australia, 31; and temperate S America, 34.—"New British Lichens," by the Rev. W. A. Leighton. Descriptions of the following 11 new or rare species are given;—*Lecidea impressula*, *L. tephrozans*, *L. ryssolea*, *L. imponens*, *L. glaucomaria*, *L. parellelaria*, *L. endomelæna*, *Odontotrema majus*, *Verrucaria neothozans*, *V. fumosaria*, and *V. pertenuis*.

Botanical News.

ARTICLES IN JOURNALS.—NOVEMBER, 1876.

Botanische Zeitung.—E. Stahl, "On the artificial production of a protonema from the sporogonium of Mosses" (see p. 19).—F. Kienitz-Gerloff, "On the genetic connexion of Mosses with Vascular Cryptogams and Phanerogams."—J. F. Fückel, "Anatomy and development of the seed-coat of some *Cucurbitaceæ* (tab. 11).

Flora.—J. Wiesner, "On a new self-registering Auxanometer" (tab. 13).—A de Krempelhuber, "Lichenes Brasilienses" (contd.).—M. Westermaier, "The first division of the cell in *Capsella Bursa-pastoris*" (tab. 14).—O. Drude, "On a mixed wood- and meadow-vegetation."—J. Müller, "Rubiaceæ Brasilienses novæ" (contd.).—W. Nylander, "Lichenes Cubanæ novæ."

Œsterr. Bot. Zeitschr.—S. Menyharth, "Species of *Lythrum* in the flora of Kalocsa."—W. Voss, "*Œcidium* on *Myricaria germanica*."—A. Kerner, "Distribution of Hungarian plants" (contd.).—Schulzer von Muggenburg, "Mycological notes" (contd.).—J. Freyn, "On Austro-Hungarian plants" (contd.).—A. Burgerstein, "Obituary notice of W. Velten."—F. Antoine, "Botany at the Vienna Exhibition" (contd.).

Bot. Notiser.—J. E. Areschoug, "De copulatione microzoosporarum *Enteromorphæ compressæ*."—S. A. Tullberg, "On forms of *Primula*."—N. J. Scheutz, "New localities."—J. M. Norman, "Further observations on *Moriolei*" (*Spheconisca*, gen. nov.).

Bull. Soc. Bot. Belg. (xv., pt. 2, Nov. 15).—A. Déséglise, "Enumeration of species of *Rosa* of Europe, Asia, and Africa, especially of France and England."

New Books.—C. Darwin, "The effect of cross- and self-fertilization in the Vegetable Kingdom." (Murray. 12s.).—J. E. Howard, "Quinology of E. Indian Plantations," pt. 2, with 15 fol. plates. (Reeve.)—J. G. Agardh, "Species, Genera et Ordines Algarum, vol. iii. Epicrisis systematis Floridearum." (Leipzig.)—K. Koch, "Die Deutschen Obstgehölze." (Stuttgart.)—P. Falkenberg, "Vergleichende untersuchungen ueber den Bau der vegetationsorgane der Monocotyledonen," with 3 plates. (Stuttgart.)

The parts of the "Linnæa" for the past year have been occupied by a catalogue of the plants collected by Willkomm in the Balearic Islands in the spring of 1873 (816 species, including a few novelties); a paper on the genus *Atriplex*, by Dr. Westerlund, with 4 plates; enumerations of the *Labiatæ* collected by Peters in Mozambique, and of Schimper's last Abyssinian gatherings (in continuation), by Vatke; an

account of the Mosses collected by Hildebrandt in Somali-land and the Comoro Islands, by C. Muller; a continuation of descriptions of new Mosses in the Melbourne Herbarium, by E. Hampe; and a continuation of Böckeler's elaborate descriptions of the *Cyperaceæ* in the Royal Herbarium of Berlin.

The volume of Pringsheim's "Jahrbücher" for 1876 contains memoirs by R. Hesse on the microscopical distinctions of the typical genera of *Lycopodaceæ*, with two plates; by J. Reinke, on Phycoxanthin, with a plate; and an elaborate one by A. Dodel on *Ulothrix zonata*, with eight plates.

Considerably after date we have now the Transactions of the Botanical Congress at Florence, held in May, 1874. The meetings were reported in our pages (J. Bot., 1874, pp. 185, 210), but in a necessarily brief manner; in this official record they are in full, and Tchistiakoff's memoir on the development of the pollen of *Coniferæ* and Archangeli's on the flowers of *Cytinus* are illustrated by several plates. In addition to the papers read at the Congress, there are here printed some which were presented but not read, including descriptions of new or little known Greek plants, by Heldreich; an advocacy of histotaxic characters for the separation of species, by Duval-Jouve; an account of English fruits, by A. Smee (with figures); and an elaborate monograph of the tribe *Salicornieæ*, by Count Ungern-Sternberg. This last appears to be a very careful synopsis of a group which has been but little attended to. His arrangement of the species necessitates the formation of two new genera, *Microcnemum* and *Heterostachys*, and the paper contains full descriptions of the species, copious synonymy, and figures of the structure of each genus. We intend giving abstracts of one or more of the memoirs above noted.

Dr. Moore has published in the Proceedings of the Royal Irish Academy a very complete account of the *Hepaticæ* of Ireland, with full synonymy, descriptions, and distribution. All the results of the investigations of the author and Dr. Lindberg, of Helsingfors, in 1873 are included, and three of the species discovered in that year well figured—*Lejeunia patens*, *L. Moorei*, and *Frullania Hutchinsiæ*, var. *integrifolia*. The remarkable richness of the country in this group of plants is shown by the addition of no less than eleven more species in the present memoir, raising the whole number of Irish *Hepaticæ* to 137.

A second edition of Mr. J. C. Melvill's "Flora of Harrow" has been published, revised, and edited by the Rev. W. M. Hind. Twelve years have elapsed since the first edition appeared in 1864 (see J. Bot., 1864, p. 350), during which period the "Flora of Middlesex" has appeared, containing much new information, and various additions to that book have been printed in this Journal, chiefly contributed by Mr. Hind. All this additional material is embodied in the new edition, but the original matter and the general arrangement of the book (both susceptible of considerable improvement) have been left, probably in accordance with school requirements, almost without alteration.

Of Bentley and Trimen's "Medicinal Plants" sixteen numbers have now appeared, containing 117 coloured plates drawn from nature. Several species of botanical interest have been figured and described, some either for the first time or more fully than before—

e.g., *Chondrodendron tomentosum*, *Cinnamodendron corticosum*, *Paullinia sorbilis*, *Erythroxylon Coca*, *Balsamodendrum Opobalsamum*, *Toluifera Pereiræ*, *Physostigma venenosum*, *Ferula galbaniflua*, *Dorema Aucheri*, *Eucalyptus Globulus*, *Artemisia pauciflora*, *Ophelia Chirata*, *Rheum officinale*, *Croton Eluteria*, *Stillingia sylvatica*.

Mr. William Whale, a nurseryman of Egham, Surrey, has printed a list of wild plants growing near that place. It is the result of twenty years' investigation, and contains over 550 species, arranged alphabetically, with localities. It seems generally trustworthy, but there are a few improbabilities—*e.g.*, *Gnaphalium dioicum*, *Lycopodium selaginoides*, *Melampyrum sylvaticum*, *Nymphæa pumila*. The localities are on the confines of three counties, Surrey, Berks, and Middlesex.

We understand that the whole stock of the English translation of Sachs' "Text-book of Botany" is exhausted, and that a new edition is in active preparation, which will include the new matter and changes introduced in the fourth edition of the original treatise.

If sixty subscribers of 5s. each can be obtained, it is intended to print a pocket list of all the European *Hymenomycetes*, arranged in the order of Fries' "Epicrisis," with the British species indicated. Each subscriber will receive three copies of the list. Names should be forwarded to W. Phillips, Canonbury, Kingsland, Shrewsbury.

Maria Emma Gray, widow of the late Dr. J. E. Gray, died on December 9th, 1876, at the great age of ninety. She possessed a good knowledge of Algæ, though nothing upon those plants was published by her, and had a large collection, which she has left to the University of Cambridge. She was entrusted with the arrangement of the British Algæ both at Kew and the British Museum, and in connection with Seaweeds her name will be kept in remembrance by the genus *Grayemma*, founded by Dr. Gray (on the *Anadyomene Menziesii* of Harvey), "a combination of the two names of my wife, who has been my companion and helper in all my studies for forty years" (Journ. Bot. 1866, p. 45). Mrs. Gray has deserved well of zoologists also, by her large series of "Figures of molluscous animals," printed at intervals from 1857 to 1874.

Mrs. Anna Russell, of Kenilworth (*née* Worsley), who has recently died, had a very good knowledge of British plants, and is frequently mentioned in Mr. H. C. Watson's works as a contributor of specimens and localities. For many years she studied carefully the higher Fungi, and made a large series of highly-finished drawings. These, amounting to over 730, she left to the Botanical Department of the British Museum, where they have been incorporated with the already extensive collection of original drawings of Sowerby, Worthington Smith, and others, rendering the series doubtless the most complete in existence. A recent remark in "Grevillea" (Dec., 1876, p. 87) that "nowhere in this country can be found a good collection of figures of Agarics," betrays a singular want of knowledge of the aids to study at our public scientific institutions.

The late D. Hanbury's large collection of materia medica specimens and his herbarium of medicinal plants have been presented by his executors to the museum of the Pharmaceutical Society.

Original Articles.

ON SOME SPECIES OF *CERASTIUM*.

By Fred. Townsend, M.A.

The late M. Ch. Grenier, in a supplement, lately published, of his "Flore de la Chaine Jurassique," has given his views of the synonymy of *Cerastium pumilum*, Curt., together with a description of the species and an arrangement of its supposed varieties. As this work may not be generally accessible, I here give a translation of his remarks on the species, and append some of my own.

"C. PUMILUM, *Curt.* (1778); *C. alsinoides*, Lois. (1805); *C. glutinosum*, Fries (1817), non H. B. K.; *C. obscurum*, Chaub. (1821). (See the synonomy at the end of this article.)

"*NOTE on C. pumilum*, Curt.—M. Babington has established the identity of *C. pumilum*, Curt., *C. glutinosum*, Fries, and *C. obscurum*, Chaub. On the other hand, in my monograph of the Cerastia, I have shown the identity of *C. alsinoides*, Lois, and *C. glutinosum*, Fries; *C. alsinoides* is therefore only a synonym of *C. pumilum*.

"In my monograph I have described *C. pumilum* and *C. alsinoides* as distinct species (*dubitanti tamen animo*, p. 35). The two descriptions should therefore be united, and also the synonyms. The same should be done with respect to *C. glutinosum* and *C. pumilum* of the "Flore de France." But a place must be reserved for the varieties of my *C. pumilum*, which I shall presently describe, and for *C. aggregatum*, Dur., which should be retained as a distinct species.

"The above-cited dates show that a discussion of the question of priority between *C. glutinosum*, H. B. K., and *C. glutinosum*, Fries, would void of interest. It is incorrect to assign the date 1828 as that of the first mention of *C. glutinosum*, Fries. The name was first published by Fries in 1817, in the first edition of his "Novitiæ," whereas *C. glutinosum*, H. B. K., Gen. et Sp. Am., 6, p. 29, bears the date 1823. It is not even certain that the latter belongs to the genus *Cerastium*, for De Candolle, in his "Prodromus," puts it at the end of the genus, in company with other species *non satis notæ*, placing the sign of doubt (?) after the generic name.

"*C. Grenieri* et *pallens* Schultz, may be added to the above synonyms. The first is simply a synonym of *C. pumilum*, but the second demands particular attention; it answers to a form which is distinguished from the type by its paler green, and by the narrow scariose border of its bracts. I propose, therefore, to retain it as a variety, if not as a species. In like manner I propose to retain *C. litigiosum*, De Lens, as a variety; this is distinguished by the petals being twice as long as the sepals.

"It remains to examine the varieties which I previously assigned

to my *C. pumilum* The first variety is founded on *C. gracile*, Duf., but this form is included in the type *C. pumilum*, with herbaceous bracts; it should therefore be excluded either as a species or variety, and the name given to it by Dufour should be placed in the general synonymy of the species.

"The second variety is a plant from the environs of Bordeaux; it is distinguishable by its broad and entirely herbaceous bracts, by its much divaricated stems and panicle, and above all by its flowers, of which many are tetramerous; nevertheless the plant has neither the form nor the other characters of *C. tetrandrum*, Curt., which, separated from its allies, may be re-established as a species.

"In accordance with the above remarks, the following is the synonymy and description of *C. pumilum*, Curt.:—

"C. PUMILUM, *Curt.*, Fl. Lond. 2, tab. 92 (1778); Babingt. Ann. and Mag of Natur. Hist., Jan., 1859, p. 20-23, et Bull. S. B. Fr., 1859, p. 70; Rchb. Ic. Germ., vol. v., tab. 228, f. 4969; *C. glutinosum*, Fries Fl. Hall. 78 (1817), et Nov. ed. 1, p. 51 (1817), et ed. 2, p. 132 (1828), et Herb. N., fasc. 4, no. 54! (non H. B. K.); *C. obscurum*, Chaub. Fl. Agen., 180, tab. 4 (1821); *C. semidecandrum*, Pers. Syn. 1, p. 521, non Lin. (1805); Lois. Fl. Gall., ed. 1, p. 271 (1806); *C. alsinoides*, Lois. in Pers. l.c., et Fl. Gall., ed 1, p. 271 (1806). et ed. 2, p. 323; *C. gracile*, L.-Duf. in DC. Prod. 1, p. 415 (1824); *C. Grenieri*, Schultz!, cent. 1, no. 16, et Introd., p. 6 (1836).—One or many spreading-ascending stems, glandular-hairy, especially the panicle. Leaves obovate. Bracts *herbaceous, or with a very narrow scarious border*. Pedicels 1-2 times longer than the calyx, *curved* at the top, horizontal or subreflexed, occasionally erect. Sepals lanceolate, herbaceous, or with a scarious margin, particularly at the summit, which is glabrous. Petals equalling or exceeding the calyx, especially in the earliest flowers. Stamens 10; filaments glabrous. Capsules twice as long as the calyx. ⊙ April, May.

"α. *genuinum*. Plant dark green; bracts herbaceous.

"β. *pallens*. Plant light green; bracts with a narrow scarious margin. *C. pallens*, Schultz, cent. 1, no. 16, et Intr., p. 6.

"γ. *litigiosum*. Petals twice as long as the calyx. *C. litigiosum*, De Lens in Lois. Fl. Gall., ed. 2, vol. i., p. 323; *C. Lensei*, Schultz Arch., 24, et cent. 1, no. 17!

"δ. *intermedium*. This is the var. α. with tetramerous and pentamerous flowers on the same plant.

"*Hab.*—Hilly slopes, dry meadows, sandy ground throughout France; the var. γ. in the Bois de Boulogne, etc.; δ. sandy ground near the sea. Bordeaux, Teste, etc."—(Pp. 47-49.)

Now if we carefully examine this description of *C. pumilum*, we find that in part it fits both *C. pumilum*, Curt., and *C. tetrandrum*, Curt., except in one character given, which is not correct as applied to either of these species, viz., "*sepals herbaceous or with membranous margins*," for the sepals of *C. pumilum*, Curt., and of *C. tetrandrum*, Curt., are never wholly herbaceous; they always have membranous margins. The form of the bracts is not given. The description of the stem is very meagre; its mode of branching is not noticed, nor is that of the panicle. The capsules are

said to be twice the length of the calyx; this character would exclude at least most English specimens, for, in the numerous specimens that I have seen, the capsule rarely exceeds the calyx by more than half the length of the latter, and it is more often less than this. Nor is the character correctly specific as applied to Continental specimens. I am therefore led to suspect that M. Grenier is not well acquainted with *C. tetrandrum*, Curt. as distinct from *C. pumilum*, Curt.; and that he has drawn up his characters of *C. pumilum* from specimens of *C. tetrandrum*, as well as of *C. pumilum*. My suspicion is strengthened by M. Grenier's conclusion given above, viz., that the description of *C. pumilum* in "Flore de France" should be united to that of *C. glutinosum* of the same work, for it is well known that *C. pumilum* of "Flore de France" is *C. tetrandrum*, Curt.

Also M. Grenier speaks of "*the type C. pumilum with herbaceous bracts*," and he further says the variety from the environs of Bordeaux is distinguishable by its "broad and entirely herbaceous bracts, by its much divaricated stems and panicle, and above all by its flowers, many of which are tetramerous. . . . ." I believe the plant from Bordeaux, which I presume to be *C. alsinoides*, Lois. and Pers., and to which M. Grenier here alludes, is one of the two tolerably well-marked forms of *C. tetrandrum* which I have myself noticed on our English coasts, and which M. M. J. Lloyd well describes in "Fl. de la Loire-Inf.," p. 43, of which the following is a translation: "Has two forms, one thick and short, very viscid, procumbent, growing in bare sandy ground; the other slender, less viscid, growing in situations in which there is more or less herbage." M. Grenier's plant I believe to be the first of these varieties.

In further support of my opinion I would call attention to Gussone's description of *C. alsinoides* in his "Supp. ad Flor. Siculæ Prod.," p. 140, which admirably describes *C. tetrandrum*, Curt., but not at all either *C. pumilum*, Curt., or *C. glutinosum*, Fries. Persoon's description of *alsinoides* (Syn. Pl., p. 521), and Loiseleur's (Fl. Gall., ed. 2, p. 324), well express *C. tetrandrum*, Curt.

If I am correct in my view, M. Grenier's α *genuinum* and δ. *intermedium* should therefore be excluded from the synonymy of *C. pumilum*, Curt., and there would remain only his β. *pallens* and his γ. *litigiosum*. Before noticing these more particularly, I would remark that in the neighbourhood of Torquay *C. pumilum* occurs abundantly, but only on the limestone, both near the sea and far inland. *C. tetrandrum* is to be found both on the limestone as well as on the sand, and it occurs inland, but more plentifully near the sea. I have failed to find even a single plant of *C. pumilum* on sandy ground; it seems to be essentially a plant of the limestone, and it prefers declivities on the hills where the limestone rock appears above the surface, and where there is short herbage and little depth of soil; I am therefore disposed to believe that it is strictly a limestone plant. All other stations in England (with one exception) given for *C. pumilum*, Curt., would suggest the same idea; the exception is the station given by Prof. Babington at the Lizard Point, Cornwall, 1839 (see his article in Ann. Nat. Hist., ser. iii., vol. iii., p. 22). Prof. Babington in the same article gives it as his opinion, after careful investigation of living and dried plants, that *C. pumilum*, Curt., *C. glutinosum*, Fries,

C. obscurum, Chaub., and *C. litigiosum*, De Lens, are the same plant, and that it inhabits dry sandy and calcareous places. Now I am not at all prepared to differ from the Professor, but from my own observations and investigations I am led to think that there are at least two forms, if not subspecies, of which our English plant is one form, and *C. glutinosum*, Fries, is another form. Fries gives as the habitat of *C. glutinosum*, "In collibus apricis arenosis sterilissimis . . . ." and he says further, "Herba flavescenti-viridis, siccata lutescens." This is certainly not true of the English *C. pumilum*, Curt., for it grows on limestone soil, and the colour is rather a dark and purplish green. M. Godron, "Flore de Lorraine," tom i, p. 110, under the name *C. alsinoides*, Lois., gives two forms, neither of which represent *C. tetrandrum*, Curt., viz, *a. obscurum*, *C. obscurum*, Chaub., which he says has herbaceous bracts, and is of a dark green, often reddish purple in its lower half; this occurs on dry slopes of the Jurassic limestone, but is rare on alluvial soil. The second form is *β. pallens;* this has the bracts narrowly membranous above, the calyx is smaller, and the seeds are half the size of var. *β.*; the plant is slender, of a pale green, and is common on alluvial soil, in meadows and sandy fields, . . . rare on Jurassic limestone, . . . in company with the var. *α.*, from which it remains very distinct. He also remarks that the seeds of *α. obscurum* are as strongly tubercled as those of *C. vulgatum*, and that *β. pallens* also has tubercled—but he does not say strongly tubercled—seeds.

Dr. Godron does not appear to know *C. glutinosum*, Fr. from having seen specimens, as he remarks that Fries characterises his *C. glutinosum* as not having tubercular seeds, and he concludes *C. alsinoides, β. pallens*, God., cannot be *C. glutinosum*, Fr., because the former has tubercular seeds. The truth appears to be that the seeds of Fries' plant are tubercular, but that the tubercles are only slightly raised, whereas the seeds of *C. obscurum*, Chaub., have more prominent tubercles than either *C. glutinosum*, Fr., or *C. alsinoides, β. pallens*, God.

Prof. Babington's description of *C. pumilum* in "Man. Brit. Bot." is so good that it would be needless to attempt another. I would only add a few remarks founded on attentive examination of herbarium specimens and extended observation of the living plant at Torquay. The early flowers of *C. pumilum*, Curt., are larger than those produced later, and they are for this reason, as well as from their being widely expanded and curved outwards, very conspicuous amongst the herbage; the petals are gradually contracted into a very short claw, or they are without claw; the width of the petal immediately above the claw —or the attachment—is only about one-half the width of the upper and widest part of the petal. The scarious margin of the upper bracts can hardly be termed albo-scariosæ in the sense in which the sepals are so. The seeds have minute, rather prominent, and somewhat acute tubercles on the back. *The curve at the top* of the flower-stalk is persistent, and though the fruit-stalk ultimately becomes erect the curve at the top causes the calyx and capsule to form an obtuse angle with it. The lower leaves in the early stage of the plant form a compact tuft; the lowest leaves have long and very narrow hafts, the upper ones are oblong; in colour the plant is darkish green tinged with reddish purple.

The stem is purplish, so is the upper herbaceous portion of the sepals and of the bracts.

Now in the specimens of *C. glutinosum*, Fr., which I possess, I find the colour of the plant is lighter than that of *C. pumilum*, Curt., the seeds are smaller and faintly tubercled, and the bracts are markedly "albo-scariosæ." Specimens of *C. litigiosum*, De Lens, from the Bois de Boulogne, also exhibit these characters. But I have plants both from limestone hills and serpentine rocks in France, the latter named *C. petræum*, F. Schultz, in "Jahrb. der Pfaeltz. Ges." (1842)—of which I have authentic specimens gathered by E. Lamy, and distributed by M. Schultz in his "Herb. Norm.," cent 1, and also by C. Billot in his "Flor. Gall. et Germ. Exsicc."—which tally exactly with English *C pumilum*, Curt. M. Boreau also includes *C. petræum*, Schultz, in his *C. obscurum*, "Fl. du Centre," p. 111. Under the same species he alludes also to *C. pallens*, Schultz, remarking that it has more decidedly scarious bracts. *C. pumilum*, *β viscarium*, Reich., "Reich. Fl. Germ. Exs.," no. 4969, of which a good figure is given in "Reich. Deutsch. Fl.," ccxxviii., is quite our English *C. pumilum*.

It is of course possible that M. Grenier had specimens of true *C. pumilum* before him when he drew up his descriptions, but considered that the very narrowly scarious, "non-albo-scariosæ" margin of the upper bracts might be termed herbaceous, and that he would include *C. pumilum*, Curt., in his *α genuinum*, otherwise; as I have endeavoured to show, his *β. pallens* and *γ. litigiosum* would represent *C. glutinosum*, Fr., and *C. pumilum*, Curt. would be but imperfectly or not at all represented in the article of which I have given a translation.

Before concluding this paper I would remark that in England the nearest allied species to *C. pumilum* is *C. tetrandrum*; but in the early state the leaves of the latter are less numerous and do not form the same compact tuft. The leaves generally are of a lighter green, though the stems are often of a deep purple. The lower leaves soon wither, whereas those of *C. pumilum* are persistent for a much longer period; but *C. tetrandrum* is a longer-lived plant than *C pumilum*, and often, after *C. pumilum* has seeded and passed away, continues to throw out branches, from the axils of the lower leaves, which attain the length of the primary branch and bear numerous flowering panicles. The first form mentioned by M. Lloyd has the branches of the dichotomous panicles subequal; the second form has them more usually unequal. The branches of the dichotomous panicles of *C. pumilum*, Curt., are subequal. The petals of *C. tetrandrum* are usually smaller than those of *C pumilum*, and are rather suddenly contracted into a very short claw, and the width of the petal immediately above the claw is only a little less than the width of the upper and widest part of the petal. The seeds have faintly-raised rounded tubercles, similar to those of my specimens of *C. glutinosum*, Fr., and *C. litigiosum*, De Lens. Both the fruit-stalk and the capsule become ultimately erect.

A SECOND HONGKONG *CLEISOSTOMA*.

By H. F. Hance, Ph.D., etc.

Cleisostoma virginale, *sp. nov.*—Foliis oblongis carnosis introveniis supra saturate viridibus medio leviter canaliculatis subtus pallidioribus vix carinatis oblongis apice late triangulari-emarginatis sinu brevissime mucronulatis 2-2½ poll. longis 9-10 lin. latis, spicis lateralibus nutantibus 4 poll. longis 20-30 floris, rachi sulcata atropurpurea supra medium tantum florifera, bracteis 3-4 ovato-lanceolatis erectis, floribus 5 lin. diametro glaberrimis sessilibus bracteolis lanceolatis demum reflexis stipatis, perigonii phyllis exterioribus parum majoribus viridulo-albis summo cucullato lateralibus oblique oblongis acutiusculis interioribus fere dimidio brevioribus oblique obovatis obtusis purpurascenti-punctatis, labelli trilobi lobis lateralibus latis truncatis subfalcatis purpureo-punctulatis terminali lineari-oblongo arcte infracto lateralibus longitudinaliter plicatis incurvis sibi applicitis, calcare 1½ lineali scrotiformi antice 4-sulcatulo collo constricto ore squama tenui glabra anguste semilunari clauso.

Supra rupes in valle Wongneichung, ins. Hongkong, primus legi m. Augusto, 1861. (Exsicc. n. 7554.)

This is the plant I alluded to in the Supplement to the Hongkong Flora, without having examined the flowers (of which there are but two remaining on my original specimen), as an undetermined species of *Appendicula*. For the living plant from which I have drawn up the above character I am indebted to the kindness of Mr. Charles Ford, Superintendent of the Government Gardens, Hongkong, by one of whose collectors it was brought in. From the more typical species it differs by the usually conspicuous fleshy protuberance closing the mouth of the spur being replaced by a delicate transverse membrane drawn across the entire width, somewhat within the orifice; but it appears in all essential respects a true member of the genus to which I refer it. It is an inconspicuous but rather pretty little plant, perhaps most nearly allied to the very imperfectly described *C. bicolor*, Lindl., from the Philippines.

NOTE ON THE GENUS *AMPHIDONAX*, N. ab E.

By H. F. Hance, Ph.D., etc.

The genus *Amphidonax* was, I believe, first proposed by the late Prof. C. G. Nees von Esenbeck in 1836,* Roxburgh's *Arundo bengalensis* being the only species referred to it. Nineteen years later it was republished from Nees' manuscripts by the late Dr. Steudel,† with a few slight verbal changes or transpositions, none of which in any way modified the character originally given, except the correction of a manifest error (*bivalvis* having been inadvertently printed for *binervis*) in the description of the lower glumella. On this occasion *Arundo*

* In Lindley Nat. Syst. Bot., 2nd. ed., 449.
† Synops. pl. Gram., 197.

bifaria, Roxb., and two previously undescribed Grasses were added to the genus, and Dr. Thwaites subsequently described* a fifth Singhalese species. An examination of the distinguishing characters assigned to this genus and its neighbours, as given by Nees himself,† and in the analytical claves of Meissner‡ and Miquel,§ will show that the sole particulars in which it is alleged to differ from *Arundo* are that the inferior flowers of each ray of the inflorescence are male, the others female; that the glumes are 1-nerved, the lower the larger; and that the lower glumella is convolute, and entire at the apex. Though Roxburgh expressed his belief‖ that the leaves of this Grass were employed by the Chinese to line sugar-candy tubs, I am not aware that it has ever been formally recorded as a native of South-eastern China, though, as it has been found in Japan,¶ its presence here might have been confidently predicted; and in fact it is to be met with, though not very commonly, in the country around Canton, where it sometimes bears a panicle a foot and a half long, very showy and handsome, from being beautifully variegated with violet and white. Most careful examinations of this Grass, made independently by the Rev. J. C. Nevin and myself, prove beyond a doubt that not only is it in every respect a true species of *Arundo*, but that it is in reality very closely allied indeed to *A. Donax*, Linn.; for the florets are all undoubtedly hermaphrodite, though from the somewhat paler colour of some of the lower pistils it is possible they do not all ripen fruit, the glumes are equal, almost as long as the florets, the lower one 5-7-nerved at the base and 3-nerved throughout, the upper 3-nerved, and the lower glumella is very distinctly bifid, with an arista between the two teeth considerably longer than in *A. Donax*.** But Nees also describes both *A. Heynei*, N. ab E., and *A. tenella*, W & A., as with homogamous florets, and Dr. Thwaites assigns hermaphrodite ones to his *A. obtusiflora*. *A. bengalensis*, N. ab E., has, I believe, an entire lower glumella, and in this respect resembles *Phragmites*; and when it is borne in mind that in *P. Roxburghii*, Kth., the lower floret is not always male, whilst in *Arundo Reynaudiana*, Kth. (which is the Asiatic form of *A. madagascariensis*, Kth.) Kunth himself testifies to having found the lower floret neuter,†† it will be seen how very unsatisfactory, slight, and interchangeable are the differences distinguishing the various so-called genera of *Arundineæ*. To me, indeed, it seems that the logical outcome of the foregoing observations is that *Amphidonax* as a genus has no *raison d'être*, and that we must also follow Grisebach in suppressing *Phragmites*. It may seem presumptuous in me to have expressed several times of late in these pages views at variance with those of such acknowledged authorities as General Munro and others; but I think opinions as to the validity and limits of genera are apt to be far more matters of tradition and habit than we are fully aware, as, for example, in the admission even

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* Enum. pl. Zeylan., 370.
† Gram. Afr. Austr., 357.
‡ Plant. vasc. Gen., 420.
§ Fl. Ind. bat. iii., 360.
‖ Fl. Ind. i., 347.
¶ Ann. Mus. bot. Lugd.-Bat. ii., 278.

** Nees himself describes it as "lanceolata, trinervia, nervis in acumen excurrentibus" (Steud. l.c.).

†† Agrostographia synopt. ii., 191.

now of such groups as *Deyeuxia* and *Psamma* apart from *Calamagrostis*. And when the principles carried out in the "Genera Plantarum" are applied to Agrostidaceæ and Cyperaceæ, they cannot fail, so far as I am able to judge dispassionately, to lead to considerable reductions, in the spirit of those I have suggested of late years.

I may here note a curious error of Nees' as to *Arundo bifaria*. He quotes under it as a synonym, "*A. triflora*, Roxb. Fl. Ind. i., 317." With that fatal facility for copying which renders it so unsafe to rely on many modern scientific works in matters of reference, Miquel transcribes this, altering the page of the book alleged to be cited to 39. Now I have before me both the first edition of Roxburgh's Flora, with Wallich's occasional additions, and the one published later by his two sons; and, though *A. bifaria* is characterised and described at page 347 in each, no such name as *A. triflora* is to be found at all. How this imaginary synonym came to be evolved I have no idea.

NEW PALMS COLLECTED IN THE VALLEY OF THE AMAZON IN NORTH BRAZIL, IN 1874.

By James W. H. Trail, M.A., M.B., F.L.S.

(*Continued from* p. 10.)

27. *B. Juruensis* (Trail hb. Palm., 165).—Humilis, aculeata; caudice ·6^{m}-1^{m} × ·01^{m}, aculeis nigris ·01^{m} sparse armato; foliis ·75^{m}-·90^{m} interrupte pinnatis, ad vaginas petiolosque aculeis compressis, 010^{m}-·025^{m}, 1-3-natim aggregatis, unaquoque apice basique spadiceo medio pallidiore, armatis; foliis junioribus ad petiolos tomento albido caduco vestitis; pinnis 4-6-jugis, solitariis vel binatim aggregatis, falcato-lanceolatis, longe acuminatis, apicalibus latioribus, supra glabris, subtus ad venas secundarias pubescentia brevissima badia obsitis, ad margines setoso-ciliatis, et ad apicem penicillatis, mediis ·18^{m}-·23^{m} × ·025^{m}-·035^{m}, apicalibus ·20^{m}-·32^{m} × ·07^{m}-·08^{m}; spatha exteriore bialata acuta, coriacea; spatha interiore ·18^{m} fusiformi aculeis compressis ·008^{m}-·012^{m} badiis 1-3-natim aggregatis armata; spadice pubescente, inermi, in ramos 2 tenues ·035^{m}-·050^{m} fisso; fl. ♀, calyce et corolla, quam calyx 1½-2-plo longiore, cupularibus, striatis, nudis; petalis rhomboideo-ovatis subtricuspidatis; andrœcei vestigio nullo; drupa (immatura) ovata, acuminata (·012^{m} × ·006^{m}), pilis brevissimis sparsis scabra.

Hab.—Ad Barreiras de Capiranga, fl. Juruá, mense Novembi.

Var. *lissospatha* (Trail hb. Palm., 166).—Spatha interiore inermi, coriacea, pubescente, ·1^{m}; spatha exteriore papyracea; spadice bitrifido; foliorum vaginis et petiolis aculeis tenuioribus subnigris armatis; pinnis haud longe acuminatis, ad margines vix setoso-ciliatis.

Hab.—Ad Barr. de Capiranga, fl. Juruá.

B. sylvatica, Barb. Rod., may possibly be the same as the variety

lissospatha, but as usual the description does not suffice for the determination of his species.

28. *B. Piranga* (Trail hb. Palm., 217).—Humilis; caudicibus 2-6 ex eodem rhizomate ortis, ·08^{m}-·30^{m} × ·012^{m}, inermibus, valide annulatis, vaginis persistentibus aculeatis obvelatis; foliis ·9^{m}-1·5^{m}, pinnatis; vagina ·15 poll. striata, setis badiis aculeis nigris ·008^{m}-·035^{m} tenuibus commixtis vestita, in ochream fibrosam pubescentem producta; petiolo ·38^{m}-·45^{m}, supra profunde sulcato aculeis ·02^{m}- 08^{m} nigris tenuibus solitariis ad basin armato, et unacum costa setis ferrugineis dense vestito; pinnis 9-12-jugis, alternis vel jugis 4-6 inferioribus subbinatim aggregatis, rhomboideo-lanceolatis, falcato-acuminatis, ·22^{m}-·25^{m} × ·025^{m}-·08^{m} (apicalibus brevioribus), atroviridibus, supra glabris, subtus pubescentibns, ad apicem solum setosis; spatha exteriore ·07^{m}-·09^{m} × ·012^{m} bialata, coriacea, pubescente; spatha interiore ·22^{m}-·28^{m}, fusiformi, setis ferrugineis dense vestita.

Spadicibus 2-4 in unaquaque stirpe, ·19^{m}-·25^{m}, pedunculo deflexo, compresso, sparse setis brevibus armato, ad apicem ramos 3 (raro 2) tenues sparse pilis ferrugineis obsitos proferente; fl. ♀, calyce cupulari, ore trifido, extus glabro, corolla quam calyx duplo longiore, ore trifida, extus sparsissime setosa; ovario ovato stigmate subtrigono apicato; drupa spherica, rostellata, glabra, ·015^{m} × ·012^{m}-·015^{m}, pulcherrima, rosea vel viridi, subtranslucida; endocarpio lenticulari.

Hab.—In sylvis recentioribus ad Santarem, fl. Jutahi, et ad Uará infra ostia fl. Juruá; flores et fructus fert mense Februario. Indi eam vocant "Maraja-piranga."

Obs.—This species is hardly likely to be mistaken for any other save the next species, *B. trichospatha*, from which it may be known by its lower stature, by the form of the spines on the petiole, by the unaculeate spathe, by the few-branched spadix, and especially by the fruits. The leaves are not unlike those of *B. tomentosa*, Mart.

29. *B. trichospatha.*—Humilis vel mediocris, aculeata; caudicibus plerumque pluribus ex eodem rhizomate ortis, plerumque 1·5^{m}-·3^{m} × :015^{m}-·025^{m} inermibus vel aculeis ad nodia in semiannulos aggregatis, vel ad internodia sparsis, armatis; foliis plerumque 1·4^{m}-2·5^{m} interrupte pinnatis, pinnis omnibus in eodem plano lanceolatis, subfalcatis, longe acuminatis, supra glabris, subtus ad venas pubescentibus, subtus pallidioribus, ad margines nigro-setoso ciliatis, vena primaria 1-venis secundariis 6-8; vaginis et petiolis ·3^{m}-·6^{m} aculeis subnigris vel unaquoque medio pallidioribus compressis ·005^{m}-·06^{m} valide armatis et unacum costis setis vel pilis ferrugineis vestitis vel plus minus leprosis; spatha exteriore coriacea, pubescente vel apicem versus setosa, ancipiti; spatha interiore sublignea, fusiformi setis ferrugineis plerumque densissime obsita ideoque velutina, aculeis nullis, vel aculeis compressis, spadiceis unaquoque medio pallidiore, ad margines dentatis, ·005^{m}-·015^{m}, sparsis, adpressis armata; spadice ·20^{m}-·35^{m}, pedunculo ·12^{m}-22^{m}, decurvo, compresso, pubescente vel velutino, ramos simplices 6-10 sursum attenuatos proferente; fl. ♂ albo; calyce membranaceo, minuto, in lacinias 3 subulatas acutas producto; corolla ·004^{m}, ultra medium trifida, petalis ovatis cuspidatis, punctatis; staminibus 6, filamentis quam antheræ dimidio longioribus subulato-filiformibus, antheris erectis; pistilli rudimento nullo; fl. ♀ viridi, calyce, et corolla quam calyx 1½-2-plo longiore

cupularibus tridentatis, coriaceis, extus sparse pilis setisve brevibus nigris obsitis ; ovario ovato, brevissime piloso ; andrœcei vestigio nullo ; drupa globosa, acuminata, diametro, ·015^{m}, nigro-violacea, pilosa vel setosa ; mesocarpio gossypioideo-pulposo ; endocarpio lenticulari, processibus extus obsesso.

Subsp. *Jurutensis* (Trail hb. Palm., 30, 31).—Minor ; caudice inermi, ·9^{m}-2·4^{m} ; foliis ·6^{m}-1^{m} ; pinnis 4-6-jugis, binatim aggregatis, ·18^{m}-·32^{m} × ·05^{m}-·08^{m}, lato-lanceolatis ; spadicis ramis 6.

Hab —Ad lacum Juruty in sylvis recentioribus.

Subsp. *trichospatha* (Trail hb. Palm., 68, 37, 145, 146,167,168).—Caudice 1·5^{m}-3^{m}, plerumque ad nodia aculeis armato ; foliis 1·4^{m}-2·5^{m}, interrupte vel raro subæqualiter pinnatis ; pinnis 11-18-jugis, 3-8-natim aggregatis, ·25^{m}-·50^{m} ×-·04^{m}-·06^{m} ; apicalibus brevioribus ; spadicis ramis 6-9.

Hab.—In sylvis primævis æque ac recentioribus ad lacum Cararaucu, fl. Amazonas ; ad Barcellos, fl. Negro ; ad Teffé ; ad. fl. Juruá, ad fl. Jutahi, ad Tonantins, et ad Tabatinga.

Var. *robusta* (Trail. hb. Palm., 51, 152, 178).—Caudice ·2^{m}-·7^{m} × ·025^{m}-·05^{m} ad nodia aculeis valide armato ; foliis 1·8^{m}-2·5^{m} interrupte pinnatis pinnis 19-26 jugis ; spadicis ramis 9-12 ; fl. ♀ corolla, et calyce quam corolla breviore, extus setosis.

Hab —Ad Humaita, fl. Madeira ; ad Pupunha, fl. Juruá ; et ad Tabatinga.

Obs. 1.—A palm (Trail hb. Palm., 62) gathered at Caburi, fl. Negro, agrees with this variety in having leaves 1·8^{m}-2·2^{m} long, with 21-22 pairs of pinnæ of the usual form and size, but the spadix bears only 6 branches ; the costa is covered with a brown tomentum above instead of being setose. This specimen agrees in all points with *B. trichospatha* save in the fl. ♀, which has the calyx rather longer than the corolla, and both envelopes glabrous externally ; possibly this is an individual peculiarity, as the flowers vary a good deal in degree of hairiness.

Obs. 2.—*B. umbrosa*, Barb. Rod. (l c., p. 29, n. 7), seems to be allied to *B. trichospatha* so far as the description can be made out, but besides the meagre nature of the description, the absence of spadix and spathes renders it impossible to arrive at certainty regarding it. I subjoin the description :—

"7. *B. umbrosa.*—Stipite mediocri, altitudine 1·5^{m}-2^{m}, diametro 0 015^{m} solitario (raro 2-3), frondibus interrupte pinnatis ; petiolo aculeato (aculeis compressis, ad extremam partem ferme nigris), invaginante (parte invaginante aculeis parvis, aculeorum petioli similibus) ; foliolis 2-4 gregatis, quorum 4-5 fasces utrinque, apicalibus minoribus 6-7 aggregatis utrinque. *Hab.*—In edidis silvis ad fluvium Trombetas. Neque flores neque fructus vidi. (Barb. Rod. hb. Palm. 331.)"

Obs. 3.—*B. elatior*, Wallace (l.c. p. 81, t. xxx.), may belong to *B. trichospatha*, with which it agrees in habit, but from which it differs in some points, viz., in the regular arrangement and smaller number (9-10 pairs) of the pinnæ, in the arrangement of the branches of the spadix, the rachis being represented long, while in *trichospatha* it is short or nearly wanting, and (from the description) in the fruit being small. Wallace makes no mention of the fruit being hairy or setose, also in his description says simply, "Spathes elongate, fusiform,

spiny," but makes no mention of their being covered with a velvet-like pile.

Obs. 4.—*B.* (*Trichobactris*) *bifida*, Œrsted (Naturahist. Forensk. Videnskab. Meddel., 1858, p. 44), approaches very closely to *B. trichospatha*, from which it differs only in the following points: "Pinnæ mediæ lineares . . . summis confluentibus . . . linearibus, apice bifidis; fl. ♂ pedicellati; fl. ♀, perigonia albicantia; ovario glabro." As the specific name *bifida* was pre-occupied when used by Œrsted, another name must be assigned to his species; I would suggest the name *Œrstediana*, in memory of its discoverer and first describer.

30. *B. incommoda* (Trail hb. Palm., 60).—Under this name I venture to describe a Palm which combines the characters of several others, agreeing as it does with *B. arundinacea* in habit, leaves, and armature, and with *B. trichospatha* in the inner spathe and peduncle of spadix being covered with short brown bristles resembling velvet, while it differs from the latter in the spadix bearing only three branches. It may prove to be a hybrid. I subjoin the description of the specimen:—

B. humilis aculeata; caudice $1{\cdot}5^{m} \times {\cdot}012^{m}$, ad internodia aculeis nigris compressis perpaucis armato; foliis 1^{m}; vagina ${\cdot}18^{m}$-${\cdot}20^{m}$, ad latera versus apicem aculeis nigris compressis ${\cdot}01^{m}$ sparse armata, petiolo ${\cdot}35^{m}$, ad basin faciei interioris aculeis nigris tenuibus ${\cdot}025^{m}$ et brevioribus armato; vagina, petiolo, et costa lepra badia vestitis; pinnis 3-$3\frac{1}{2}$-jugis, 1-2-natim aggregatis, ${\cdot}28^{m}$-${\cdot}40^{m} \times {\cdot}03^{m}$-${\cdot}05^{m}$ (apicalibus ${\cdot}40^{m} \times {\cdot}08^{m}$-$10^{m}$), lanceolatis, subfalcato-acuminatis, marginibus sparsissime setoso-ciliatis, supra glabris, subtus ad venulas brevissime pubescentibus; spatha exteriore coriacea; spatha interiore ${\cdot}26^{m}$ fusiformi, setis badiis velutina et aculeis brevibus compressis perpaucis armata; spadice ${\cdot}22^{m}$, pedunculo aculeolis badiis obsesso, semierecto in ramos tres, ${\cdot}05^{m}$ longos, ad apicem fisso; floribus ——; fructibus ——.

Hab.—In sylvis ad Paranáquara, fl. Madeira.

31. *B .Maraja.*—Caudicibus plerumque consociatis, mediocribus vel elatis (sub $7^{m} \times {\cdot}015^{m}$-${\cdot}04^{m}$), infra nodia aculeis nigris compressis armatis; foliis interrupte pinnatis, $1{\cdot}5^{m}$-$2{\cdot}4^{m}$, ad vaginas, petiolos, et costas subglabras, aculeis compressis badiis vel subnigris tandem medio expallidis, ${\cdot}005^{m}$-${\cdot}08^{m}$, e basi callosa nigra ortis, valide armatis; pinnis 9-14-jugis solitariis vel 2-3-natim aggregatis, subcrispis, linearivel obovato- lanceolatis longe subfalcato acuminatis, ad margines et supra ad venam mediam apicem versus setoso-ciliatis, supra glabris, subtus pallidioribus, et ad venulas plus minus paleis brevissimis obsitis; spatha exteriore bialata coriacea, interdum versus apicem aculeis sparsis armata; spatha interiore lignea, aculeis sparsis vel crebris, compressis vel compresso-triquetris, medio expallidis armata, inter aculeos tomento vel pubescentia albido-badia obsessa; spadice ramoso, pedunculo tomentoso (rarius aculeis sparsis armato), decurvo, compresso; rachi plus minus producta ramos 7-20 vel plures sursum attenuatos edente; drupa depresso-globosa rostellata, ${\cdot}015^{m} \times {\cdot}012^{m}$, glabra, atroviolacea; mesocarpio gossypyoideo-pulposo, acido, dulci; endocarpio triangulari, sublenticulari; drupæ calyce et corolla, quam calyx duplo longiore, ore multifidis extus glabris vel brevissime et sparsissime pilosis; androecei vestigio nullo.

Hab.—Per totam plagam Amazonensem in sylvis humidis (Ygapó,) prope fluminum ripas, et in paludibus frequens.

Subsp. 1.—*Marajá* Mart. (Trail hb. Palm., 4).—Caudice elato 4·5^{m}-6^{m} × ·03^{m}-·05^{m}; foliis 1·8^{m}-2·5^{m}; vagina aculeatissima; petiolo et costa subtus valide aculeatis, aculeis ·005^{m}-·08^{m}, compresso-triquetris, cavis, fragilibus, apice basique nigris, medio stramineis, 1-4-natim aggregatis; pinnis 10-12-jugis, lanceolatis vix subfalcatis longe acuminatis (basalibus ·30^{m} × ·03^{m}, mediis ·30^{m}-·38^{m} × ·035^{m}-·045^{m} apicalibus ·35^{m} × ·14^{m} apice multifidis); spatha interiore lignea, fusiformi (·75^{m} × ·04^{m}), aculeatissima, et tomento albido-badio obsessa, aculeorum impressionibus profunde sulcata, aculeis iis vaginæ similibus sed minoribus (·008^{m}-·025^{m}), et e basi albida callosa ortis et ad angulos floccis albidis obsitis, reflexis vel patulis, apicem versus spathæ brevioribus; spadice ·7^{m}, pedunculo apicem versus inter pubescentiam badiam aculeis sparsis, ·01^{m}, adpressis armato, rachi ·1^{m}, ramos 20 et plures, sursum attenuatos, ·22^{m}-·25^{m} edente.

Hab.—Ad Obydos.

Obs.—The description given by Martius in Hist. Palm, vol. ii., p. 93, agrees perfectly with the common form of *B Marajá* (viz., that just described), save that he says "caudex sub 50-pedalis, diametro 3½-4 pollicari," a statement founded unquestionably on some error of recollection or in notes made by him, as the tallest seen by myself never exceeded 25 feet in height by 2 inches in diameter. In the "Palmetum Orbignianum" (p. 64) he gives an amended diagnosis of *B. Marajá*, in which almost the only addition is "spatha nigro-setulosa," a character that I have never observed in this species.

Subsp. 2.—*Sobralensis* (Trail hb. Palm., 127).—Caudice 3·5^{m}-6^{m} × ·025^{m}-·04^{m}; foliis 1·8^{m}; vagina aculeis compressis, nigris, ·005^{m}-·015^{m}, solitariis vel binatim aggregatis armata; petiolo usque ad medium faciei interioris aculeis crebris ·01^{m}-·025, subnigris, medio albidis, 2-8-natim aggregatis, armato, ultra medium et subtus inermi; costa inermi; pinnis 9-jugis, lineari-lanceolatis (·42^{m}-·48^{m} × ·045^{m}-·05^{m}); spatha interiore (·32^{m}-·38 × ·03^{m}-·04^{m}), sparsissime et brevissime pilosa, et aculeis sparsis compressis, ad margines serratis, spadiceis ·008^{m} armata; spadice ·3^{m}, pedunculo ·2^{m}, piloso; rachi ·025^{m}, ramos 7, ·1 proferente; fl. ♀ calyce et corolla glabris; drupa subsp. *Marajæ*.

Hab.—In sylvis humidis ("Varzea") ad Sobral, fl. Purus mense. Septembri.

Subsp. 3. *Limnaia* (Trail hb. Palm., 112).—Minor, caudice 1·8^{m}-3^{m} × ·01^{m}-·025^{m}; foliis 1·3^{m}-1·8^{m}; petiolo (vagina inclusa), et costa subtus valide aculeata, aculeis spadiceis, medio tandem expallidis 1-2-natim aggregatis, ·01^{m}-·05^{m}; pinnis 10-14-jugis, obovato-lanceolatis, inæqualiter tenui-cuspidatis (·30^{m}-·38^{m} × ·05^{m}-·08^{m}); spatha interiore (·25^{m}-·32^{m}) extus sulcata, ad medium aculeis sparsis, subreflexis, compressis, ad margines serratis, ·006^{m}-·008^{m} spadiceis armata; spadice ·25^{m}, badio-tomentoso, rachi ·035^{m} ramos 11-13 tenues ·07^{m}-·09^{m} proferente; fl. ♀ corolla brevissime et sparsissime setosa (drupa immatura ovali, ·015 × ·008^{m} glabra).

Hab.—In paludibus in rivis (Igarape de remedio, &c.) prope urbem Manaos.

32. *B. confluens*, Linden et Herm. Wend.—Var. *acanthospatha* (Trail hb. Palm., 202, 211).—Subhumilis; caudice ·12^{m}-1·2^{m} × ·015^{m}-

·025^{m}, annulato, inermi vel aculeis paucis nigris subarmato; foliis 1·8^{m}-2·7^{m}, interrupte pinnatis; vagina ·2-·3^{m} aculeolis adpressis (quasi ut in *Iriartea setigera*) vel aculeis sparsis ·01^{m}-·02^{m} compressis subnigris medio sub-pallidioribus armata; petiolo ·4^{m}-1^{m} subtereti, supra profunde scisso, inermi, vel aculeis subulatis acutis nigris, basin versus pallidioribus, ·02^{m}-·08 , solitariis vel binatim aggregatis, sparse armato, et unacum costa tomento e paleis fuscis minutis composito obducto; pinnis 7-10 jugis, subcrispis binatim aggregatis (gregibus alternis, ·08^{m} dissitis), pinna superiore cujusque gregis majore quam inferior, pinnis lanceolatis, subfalcato-cuspidatis acumine tenuissimo, ultra medium latioribus, ad margines et ad venæ primariæ apicem setoso-ciliatis, supra glabris, subtus minute striguloris, ·25^{m}-·6^{m} × ·04^{m}-·1^{m}; spatha exteriore coriacea, apice acuta, aculeolis sparse armata; spatha interiore (3^{m}-·45^{m}) fusiformi, aculeis ·01^{m}-·04^{m}, fulvis, nitidis, imbricatis, compressis, ad margines serrato-dentatis, creberrimis, spathæ apicem versus spadiceis armata; spadice ramoso, pedunculo pubescente, rachi ·04^{m}-·05^{m} ramos 8-10 tenues, ·09^{m}-·12^{m} proferente; drupa depresso-globosa (·015^{m} × ·018^{m}), rostellata, glabra, purpurea; mesocarpio ut in *B. Marajá*, endocarpio lenticulari, subquadrangulari, processibus extus obsesso; drupæ calyce et corolla, quam calyx duplo longiore, coriaceis, extus sparse setosis.

Hab.—In sylvis primævis æque ac recentioribus editioribus prope vicum Fonte boa; et ad Barreiras de Mutum, fl. Jutahi.

From the type as described by its authors (Linnæa, v. xxviii., p. 347), the variety just described differs in the shorter stem (2^{m}-3^{m}), in the midrib of the leaf being unarmed instead of spiny along its whole length; in the spines being longer when present (·04^{m}-·06^{m}); in the pinnæ being broader in proportion to their length (·32^{m}-·37^{m} × ·022^{m}-·024^{m}), with the terminal pinnæ not much broader than the others; in the much longer spines on the spathe (·001^{m}-·004^{m}), only rather darker at tip of spathe; in smaller number of branches of spadix (12-14), and in lenticular putamen (putamine obovato). [The figures, &c , within brackets are taken from Linden and Wendland's description.]

Probably both should be regarded as forms (subspecies?) of *B. macroacantha*, Mart., which differs from *acanthospatha* chiefly as follows:—"Rachibus glabris; pinnis 15-18-jugis, rarius pluribus, suboppositis sparsisve; spadicis pedunculo pilis ferrugineis erectis hirto, ramos 11 pubescentes 6-10 pollicares proferente, drupa ignota."

33. *B. Constanciæ*, Barb. Rod. (l.c., p. 37, no. 30); (Trail. hb. Palm., 13, 114).—Humilis, aculeata; caudicibus 6-7 ex eodem rhizomate ortis, ·3^{m}-·6^{m}, aculeis nigris longis armatis; foliis 1·8^{m}-2^{m}, interrupte pinnatis, erecto-patulis, subcrispis, ad vaginas (3^{m}) et petiolos subteretes supra scissos aculeis armatis, aculeis petioli solitariis vel 2-4-natim aggregatis, sparsis, nitidis, nigris, basi albicantibus, ·02^{m}-·1^{m}, tenuibus, acutis; costa aculeis brevioribus subarmata, unacum petiolo lepra badia decidua obsessa; pinnis 14-18-jugis, 2-3-natim in greges alternas aggregatis, subfalcato-lanceolatis, ·3^{m}-·35^{m} × ·045^{m}, inæqualiter in cuspidem longam tenuissimam productis, supra glaberrimis, sed ad margines et ad venam primariam supra aculeolis nigris ciliatis, subtus præter margines virgis fulvis, e pilis brevibus compositis, ornatis; spatha exteriore coriacea, bialata, apice acuta, extus

ferrugineo-tomentosa; spatha interiore lato-fusiformi, sublignea, ·32^{m}-·35^{m}, tomento fulvo vestita, aculeolis nigris creberrimis, ·001^{m}-·002^{m}, adpressis, et sursum aculeis nigris, compressis, semi-patulis, ·005^{m}-·008^{m}, sparse intermixtis armata; spadice tomento fulvo obsesso, sub ·3^{m}, pedunculo ·16^{m}, rachi ·02^{m}, ramos 20-24 tenues ·1^{m} edente; fl. ♂ ——; fl. ♀ calyce cupulari et corolla, quam calyx 2-3-plo longiore urceolata, ore tridentatis, extus lanatis; drupa depresso-globosa ·024^{m} × ·018^{m}, rostellata, coccinea, tandem atro-violacea, processibus vel spinis carneis ·003^{m}-·004^{m}, apicem versus curvatis, dense obsessa, ad apicem solum nuda; mesocarpio pulposo, succulento; endocarpio lenticulari, subtriangulari, nigro, lævi. [Tab. 184, fig. V.]

Hab.—In sylvis humilioribus, recentioribus ad lacum Achipurá ad fl. Trombetas, et prope urbem Manaos.

Obs. 1.—This is well distinguished from all other species of *Bactris* by the fruit, which is peculiar in being covered with fleshy bristles or spines like those on the capsules of *Bixa Orellana*. In stem, armature of leaves, and pinnæ it comes next to *B. macroacantha*, Mart.

Obs. 2.—I am fortunately able to identify this as one of Dr. Rodriguez's species, from having been in his company when it was found (by one of our men) near Lake Achipurá.

34. *B. acanthocarpa*, Mart. (Trail. hb. Palm., 221).

Subsp. *Trailiana*, Barb. Rod. (l.c., p. 27, no. 3); (Trail hb. Palm., 15).—Acaulis vel caudice sub ·15^{m}, foliis 2^{m}-2·5^{m}, simplicibus bifurcis; vagina, petiolo, et costa *B. acanthocarpæ*, Mart., lamina 1·4^{m}-1·7^{m}, ad ⅓ bifida, medio ·3^{m}-·35^{m} lata, supra glabra sed venis prominentibus, subtus ad venas ferrugineo-leprosa, ad margines exteriores venis in dentes excurrentibus, subciliata; laciniis apice subacuminatis, tandem fissis; venis primariis utrinque 21-25, ·012^{m}-·018^{m} dissitis, bis flexis, medio angulum cum costa 18°-30° efformantibus; spathis *B. acanthocarpæ;* spadice minore, pedunculo inermi, pubescente, rachi ·07^{m} ramos 30 pluresve tenues, ·05^{m}-·07^{m}, edente; fl. ♀ calyce cupulari, et corolla quam calyx duplo longiore urceolato-ovata, extus infra medium setosa, coriaceis, ore tridentatis; drupa *B. acanthocarpæ*, Mart.

Hab.—In sylvis primævis ad lacum Caypuru, fl. Trombetas.

Obs.—*B. acanthocarpoides*, Barb. Rod. (l.c., p. 33, no. 20), is simply a variety of *B. acanthocarpa*, the only difference being that the fruit is yellow instead of red. I quote the description—"20. *B. acanthocarpoides*.—Stipite cæspitoso, 2^{m}-3^{m} alto, aculeato; frondibus pinnatis; foliolis alternis obsoleto-falcatis, acuminatis; spadice polyramoso; drupa globoso-turbinata, lutea, aculeata. (Barb. Rod. hb. Palm., 349)."

35. *B. oligocarpa* (Trail hb. Palm., 21, 45).—Humilis; caudice solitario inermi, ·6^{m}-·12^{m} × ·006^{m}-·01^{m}, pubescentia badia caduca obsito, apicem versus vaginis aculeatis vestito; foliis ·7^{m}-1^{m}, paucipinnatis, ad vaginas et petiolos longos ad basin aculeis solitariis vel 2-4 aggregatis sparsis tenuibus nigris ·005- 030 armatis, et lepra ferrugine a vestitis; pinnis 3- (raro 2-2½) jugis, apicalibus et basalibus oppositis, lanceolatis, subfalcatis, tenui-acuminatis, mediis angustioribus, vena primaria unica, ·25^{m}-·32^{m} ⨯ ·04-·05 (basilabus), ·025^{m} × ·035^{m} (mediis). ·06^{m} ⨯ ·09^{m} (apicalibus)), supra glabris subtus ad venas sparse pubescentibus, ad margines vix setoso-ciliatis; spatha ex-

teriore coriacea, apice acuta, bialata; spatha interiore ·12^{m}, coriacea vel sublignea, inermi, pubescente; spadice simplici, ·1^{m}, pubescente, rachi ·03^{m}-·04^{m}; fl. ♂ ——; fl. ♀ ——; drupis ovato-oblongis, rostellatis, glaberrimis, atroviridibus, ·018^{m}-·022^{m} × ·01-·015^{m}, mesocarpio succulento subdulci, gossypioideo, endocarpio ovali, utrinque acuto, subgibboso, supra medium foraminibus perforato, nigro; drupæ calyce et corolla duplo longiore ore multifidis extus nudis, striatis, androœceo sterili magno cupulari, corollæ adnato, quam corolla dimidio breviore.

Hab.—In sylvis primævis prope Aveyros, fl. Tapajos; et ad Camarao, fl. Mauhes.

Var. *brachycaulis* (Trail hb. Palm., 58).—Under this name I separate from *B. oligocarpa* a Palm found by me near Esaltacion, on the Rio Madeira; it differs from the true *B. oligocarpa* in having shorter leaves (about ·6^{m}), very like those of *B. Juruensis*, with short petiole and vagina (each about ·1^{m}), both entirely unarmed. The inner spathe is unfortunately wanting, but the spadix and fruits agreed completely with the same parts in *B. oligocarpa*.

Obs. 1.—This species in habit and in leaves strongly resembles *B. Juruensis*, *B. incommoda*, and *B. tenuis;* it is also very like *B. eumorpha*, from which it may be distinguished, however, by the armature of the leafstalks. When bearing spadix and spathes, and still more when in flower or fruit, it is easily recognised by the absence of spines on the spathes, by the simple spadix, by the large oval fruits with oval endocarp, and by the presence of a large sterile androœceum.

Obs. 2.—Dr. Rodriguez (l.c., p. 28, no. 6) has published a diagnosis with which I furnished him (as well as with specimens); unfortunately the diagnosis is faulty as well as full of printer's errors.

36. *B. bifida*, Mart. (Trail hb. Palm., 55, 86).

Var. *Humaitensis* (Trail hb. Palm., 52).—Minor; caudice inermi, ·1^{m}-1·2^{m} × ·008^{m}; foliis ad $\frac{1}{6}$-$\frac{1}{7}$ bifidis; vagina setoso-aculeata; petiolo et costa ad basin aculeis perpaucis solitariis tenuibus armatis; alis ·7^{m}-·8^{m} × ·07^{m}; venis primariis utrinque 15-17, angulo costali 10°; drupis minoribus (·016^{m} × ·01^{m}) oblongis, subobtusis.

Hab.—Ad Humayta, fl. Madeira.

Var. *Puruensis* (Trail hb. Palm., 121).—Caudice inermi, sub ·1^{m}; foliis 1·8^{m}, ad $\frac{1}{4}$ bifidis; vagina setoso-aculeata; petiolo facie superiore aculeolis, subtus unacum costa aculeis, ·03^{m}-·08^{m}, valide armato; alis 1·4^{m}-1·5^{m} × ·06^{m}-·07^{m}; venis primariis utrinque 20-21, angulo costali 6°; spatha interiore et spadice paullo longioribus quam in exemplis typicis.

Hab.—In sylvis recentioribus ad Tabocal, et in insula Guajaratuba, fl. Purus.

37. *B. aristata*, Mart. (Trail hb. Palm., 67).—I have only to add to Martius' description the following points:—Vagina striata, pubescentia badia vestita et unacum petiolo aculeis ·01^{m}-·03^{m} nigris tenuibus horrida; petiolo et costa lepra ferruginea obsessis, costa aculeis paucis ·05^{m}-·08^{m} nigris tenuibus armata; pinnis 7-16-jugis, lineari-lanceolatis ·4^{m} × ·02^{m}, extremis connexis, folii venis primariis utrinque 24, subrectis, angulo costali 17°-27°; spatha interiore ·35^{m}; spadice ·35^{m} inermi, ferrugineo-leproso, rachi ·1^{m} (cauda sterili 03^{m} inclusa); fl. ♂

breviter pedicellatis, calyce minuto ut in *B. concinna*, Mart., corolla ultra medium trifida, petalis ovato-lanceolatis, acuminatis; fl. ♀, viridibus, calyce cupulari, coriaceo, ore irregulariter fisso, extus nudo, striato, corolla quam calyx 2-3-plo longiore, urceolata, ore angusto 3-denticulata, extus brevissime setosa; androœceo sterili magno, cupulari, quam corolla dimidio breviore.

Hab.—In sylvis recentioribus prope pagum Barcellos, fl. Negro.

38. *B. concinna*, Mart. (Trail hb. Palm., 48).—I have to add to Martius' description:—Pinnis (28-jugis, *fide* Spruce) 37-40-jugis; fl. ♀ androœceo sterili, corollæ adnato, cupulari; drupis ·021^{m} × ·018^{m}, scabris, tandem glabris.

Hab. –In sylvis humidis ("Varzea") in provincia Amazonensi.

Subsp. *depauperata* (Trail hb. Palm., 216).—Minor; caudicibus plerumque solitariis 1^{m}-1·5^{m} × ·008^{m}-·015^{m}, inermibus; foliis paucis contemporaneis 1^{m}-1·4^{m}; vagina (·12^{m}) et petiolo (·22^{m}-·38^{m}) ad basin aculeis paucis tenuibus nigris ·005^{m}-·05^{m} armatis, costa inermi; pinnis 17-21-jugis ·3^{m} × ·01^{m}, iis *B. concinnæ*, Mart., similibus; spatha interiore ·15^{m}, aculeis badiis tenuibus ·012^{m}, adpressis, sursum frequentioribus subarmata; spadice ·14^{m}, inermi, rachi 0·3^{m}.

Hab.—In sylvis prope Santarem, vicum Indorum Cataukena, fl. Jutahi.

39. *B. socialis*, Mart. (Palmet. Orbign., pp. 56-7, t. xiv., 2, et t. xxvi., D.)

? Subsp. 1. *Gaviona* (Trail hb. Palm., 156).—Caudice 3^{m}-3·6^{m} × ·025^{m}, ad internodia aculeis ·025^{m} nigris, compressis, 1·2-natim aggregatis armato; foliis 2·4^{m} pinnatis; vagina (3^{m}) in ochream fibrosam aculeolatam producta, striata, unacum petiolo et costa setulis badiis dense obsessa, vagina apicem versus et petiolo aculeis subnigris ·02^{m}-·1^{m} tenuibus horride armatis, petiolo subtriangulari-tereti, costa supra acute carinata; pinnis 33-jugis, concinnis pectinatis, rigidiusculis, subplicatis, ensiformibus, acuminatis, ·45^{m}-·62^{m} × ·03^{m}-·035^{m}, apicalibus minoribus, ad margines et supra ad venam primariam, apicem versus, setis nigris ciliatis, subtus siccis iridescentibus; spatha exteriore sublignea, apice acuta, apicem versus aculeolata, dorso bicarinata; spatha interiore ·45^{m}, aculeis ·02^{m}-·04^{m} tenuibus nigris, patulis horridissima; spadice ·40^{m}, pedunculo (·25^{m}-·40^{m}), aculeis nigro-badiis horridissimo, ad apicem in ramos 4 robustos ·1^{m}-·15^{m} fisso; fl. ♂ pedicellatis; fl. ♀ calyce cupulari, ore trifido, nudo, corolla quam calyx duplo vel triplo longiore lageniformi ore tridentato extus villosa, intus androœceo sterili cupulari ipsa ¼ breviore tecta; drupa ovata, rostellata, ·025^{m} × ·015^{m}, brevissime setosa; mesocarpio tenui, gossypioideo; endocarpio ovato, apice acuto, albo, ligneo.

Hab.—In sylvis primævis ad Gavião, fl. Juruá, mense Novembri; et ad Uará, fl. Solimões, infra ostia fl. Juruá, mense Februario.

? Subsp. 2. *Curuena* (Trail hb. Palm., 206).—Caudice 2·5^{m}-4^{m} × ·018^{m}-·03^{m}, aculeis nigris ad nodia armato; foliis 1·5^{m}-2^{m}, interrupte pinnatis; vagina, petiolo, et costa subtus glabris sed aculeis compressis acutis, .01^{m}-·05^{m}, basi albidis, medio spadiceis, apice subnigris, ad margines pallidioribus, subretroflexis armatis; costa supra carinata, sulcis lateralibus, præsertim ad bases pinnarum, sparse hirtotomentoso; pinnis 29-jugis 1-7-natim aggregatis (15-16-jugis apicalibus subæquidistantibus) ensiformibus, apice subbidentulis, ·55^{m}-

·65^{m} × ·025^{m}-·03^{m} (apicalibus et basalibus minoribus), supra subtusque glabris, ad margines et ad venam primariam supra, apicem versus setoso-ciliatis; spatha exteriore *B. Gavionæ;* spatha interiore ·42^{m}, lignea, valide striata, pubescente, aculeis sparsis compressis ·005^{m}-·05^{m}, retroflexis, subnigris vel medio pallidioribus, spathæ apicem versus longioribus armata; spadice ·35^{m}, pedunculo ·24^{m} decurvo, compresso, aculeolis badiis brevissimis velutino, ad apicem in ramos 3 robustos ·11^{m}, fisso; fl. ♀ calyce, et corolla quam calyx 2-3-plo longiore, cupularibus ore 3-dentatis; androœceo sterili cupulari, corollæ adnato; drupa ei *B. Gavionæ* simili.

Hab.—In sylvis inundatis ("ygapo") prope ostia fl. Curuem, brachii fl. Jutahi.

Obs.—In the analytical key I have specially noted the points in which *B. Gaviona* and *B. Curuena* differ from *B. socialis*, Mart., of which I consider them subspecies; hence I need not repeat my remarks here. They seem nearly allied to *B. ciliata*, Ruiz et Pavon, to *B. infesta*, Mart., to *B. chætorachis*, Mart., to *B. setosa*, Mart., and to *B.* (*Guilielma*) *tenera*, Karsten. *B. ciliata* is distinguished by its larger size (caudice 30-40 pedali), *white* hairs on midrib, pinnæ with the nerves hairy below, ♂ flowers sessile (?), with petals separate nearly to base, very broadly ovate and blunt, anthers much wider below and short, and putamen obovate.

B. infesta, Mart., can hardly, I think, be regarded as really distinct from *B. socialis*, Mart., from which it is distinguished only by the stem bearing spines on the internodes as well as on the nodes, by the vagina and inner spathe being slightly less spiny, by the pinnæ being collected into groups, and by the petiole and midrib being tomentose instead of hairy or setose; the fruits are also somewhat smaller, and are smooth; the corolla is said to be inclosed in the calyx, though figured twice as long as calyx From *B. Gaviona* it differs chiefly in stem (10-12 pedalis × 4 pollicari), in the rachis being tomentose, in the pinnæ being in groups of 4-6 and narrower than in *B. Gaviona*, in the spadix bearing 6-10 branches, and in the fruit being larger and smooth; it resembles *B. Curuena* more closely.

B. setosa is well distinguished by the spadix bearin 20 or more branches, by the sessile ♂ flowers, by the calyx of the ♀ flower being much shorter than the corolla, by both of them being glabrous, by the globular fruit, and by the lenticular endocarp.

B. chætorachis, by Martius' description, is very nearly allied to *B. Gaviona* and to *B. Curuena*, from which it differs chiefly in the smaller number of pinnæ (20-jugis vel pluribus), in the spines of the inner spathe being shorter, and in the branches of the spadix being more numerous (10-12); the flowers are unknown, or they might possibly yield other distinctions.

B. tenera, Karsten, is distinguished from both *B. Curuena* and *B. Gaviona* by the spines of the petiole being white with black tips, by the pinnæ being collected into groups of 5-6 and being broader than in these forms (18 × 2 inches), by the spines of the inner spathe being white with black tips, by the ♀ flower having both calyx and corolla tubular and glabrous, by the smaller fruit (nucis avellanæ minoris magnitudine), and by the lenticular endocarp.

(*To be continued.*)

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. Holmes, F.L.S.

(*Continued from p.* 16.)

Leucobryaceæ.

Leucobryum glaucum, *Hampe. Dicranum glaucum*, Hedw. (Jenner Tunbr.).

On heaths, and in sandy woods. November to March. Bry. Eur. i., t. 97, 98.

Abbey Wood; abundant; *George!* Joyden's Wood; Ightham Woods. Fructification has not as yet been met with in Kent.

Dicranaceæ.

Tribe 1. *Pleuridieæ.*

Pleuridium nitidum, *Br. & Sch. Phascum axillare*, Dicks. (Jenner Tunbr.). *Phascum nitidum*, Hedw. (Wils.; Hobk.).

On damp clayey earth in woods and near ponds or streams. Spring, autumn. Bry. Eur. i., t. 9.

Neville Park Farm; *Jenner Tunbr.* Near a small pool in Joyden's Wood.

P. subulatum, *Br. & Sch. Phascum subulatum*, L. (Wils.; Hobk.).

On sandy hedgebanks, in woods and in heathy places, &c.; common. March, April. Bry. Eur. i., t. 9.

Abbey Wood; Matfield Green, near Tunbridge Wells; Ightham.

[*P. alternifolium*, Br. & Sch., very similar in appearance to the last, but a taller plant, having gemmiform barren flowers, and the perichætial leaves suddenly dilated at the base; should be looked for on fallow ground.]

Seligeria calcarea, *Br. & Sch. Weissia calcarea*, Hedw. (Jenner Tunbr.); *Grimmia calcarea*, Smith (B. G.)

On the perpendicular sides of chalk pits; common. April, May. Bry. Eur. ii., t. 110.

Dartford; *Sowerby in B. G.* Hill above Westerham; Morant's Court Hill; *Jenner Tunbr.* Greenhithe; *George!* Wrotham.

S. paucifolia, *Carr. Weissia pusilla*, Hedw. (Jenner Tunbr.). *S. calcicola*, Mitt. (Berk.).

On chalk stones partially imbedded in earth; in woods and shady places; frequent. April, May. Journ. Bot., 1864, t. 19.

Morant's Court Hill; *Jenner Tunbr.* Wood near Dunton Green; in the lane leading from Dartford to Darenth Wood; Boxley Hill, Maidstone, in the wood; Undercliff, near Folkestone.

[The plant recorded in *Jenner Tunbr.* is *Weissia pusilla*, E.B., 2551, Musc. Brit., t 15 (= *Seligeria pusilla*, Br. & Sch.); but as that species usually grows on mountain limestone, not on chalk, and as *S. paucifolia* is abundant on Morant's Court Hill, I have supposed *S. paucifolia* to be the plant intended; it was not distinguished as a separate species in 1845.] From *S. calcarea* it is readily known by the narrower mouth of the capsule, that of *calcarea* being dilated. From *S. pusilla* it may be known by its capsule not being shrivelled when dry.

[*Brachyodus trichodes*, N. & H., and *Campylostelium saxicola*, Br. & Sch., have been found on sand rocks in Sussex, and should be looked for in the Weald of Kent.]

Tribe 2.—*Dicranellæ*.

DICRANELLA VARIA, *B. & Sch. Dicranum varium*, Hedw. (Wils.; Hobk.).

Rubble heaps, damp spots by roadsides, &c.; frequent. Winter. Bry. Eur. i., t. 57, 58.

Greenhithe; *George!* Otford; *Howse!* Var. γ *tenellum*, Wils.; Charlton, in the chalk pit. Var. δ. *callistomum*, Wils.; Pembury, near Tunbridge Wells.

[*D. rufescens*, Br. & Sch., with the whole plant having a pale reddish hue and bright red stems and an erect capsule, should be looked for on moist sandy banks, during October and November; also *D. crispa*, Br. & Sch., which has perfectly straight, striated capsules, a long lid, and spreading leaves, crisped when dry. The latter species grows in Sussex near the High Rocks, not fifty yards from the Kentish boundary.]

D. CERVICULATA, *Br. & Sch. Dicranum cerviculatum*, Hedw. (Wils.; Hobk.).

On peaty soil in damp heathy places in subalpine districts; not common. June, July. Bry. Eur. i., t. 56.

In a damp quarry near the Toad Rock, Rusthall Common, Tunbridge Wells.

D. HETEROMALLA, *Br. & Sch. Bryum trichoides reclinatis cauliculi-capitulis erectis acutis* (Ray Syn. iii., p. 96); *Bryum heteros mallum*, Fl. Metr.; *Dicranum heteromallum*, Hedw. (Wils.; Hobk.).

On sandy banks and moist places; common. November to March. Bry. Eur. i., t. 62.

About Woolwich, *Ray Syn.; Fl. Metr.* Greenhithe, *George!* Abbey Wood; Sevenoaks; Selling; Bexley; Willesboro' Lees. Var. β. *strictum;* in a wood E. of Otford.

[*D. cerviculata* is known from this species by its capsule being strumose, by its shorta seta, and by its fruit being mature in June].

DITRICHUM HOMOMALLUM, *Hampe. Didymodon heteromallum*, Hook. & Tayl. (Jenner Tunbr.); *Trichostomum homomallum*, Br. & Sch. (Wils.; Hobk.); *Leptotrichum homomallum*, Müll., (Berk).

In sandy places in subalpine woods and on heaths; not common. Autumn. Bry. Eur. ii., t. 181.

In the Five Hundred Acre Wood, Buckhurst Park, abundant, 1837; Crowborough Warren, rare; *Jenner Tunbr.* Joyden's Wood; *George!*

The *Didymodon pusillus* of Jenner Tunbr. (*Trichostomum pusillum*, Forster Tonbr.) is probably referable to this species, although that name is usually given as a synonym for *Trichostomum tortile*, Schrad.

MISSOURI BOTANICAL

D. FLEXICAULE, *Hampe*. *Trichostomum flexicaule*, Br. & Sch. (Wils.); *Leptotrichum flexicaule*, Müll. (Berk.; Hobk.).

Amongst short grass on chalky banks and in forsaken chalk quarries. Always barren in Britain. June. Bry. Eur. ii., t. 180.

Bluebell Hill, near Maidstone, sparingly; in an old quarry, near Shoreham, very fine and abundant. Not common.

LEPTODONTIUM FLEXIFOLIUM. *Didymodon flexifolius*, Hook. & Tayl. (Wils.; Berk.; Hobk.)

On damp grassy, heathy places and in woods; rather rare. February. Bry. Eur. ii., t. 188. Hayes Common.

Th species is easily distinguished from *Tortula convoluta*, which it resembles in its yellowish-green colour, by the serrated apex of the leaves.

Tribe 3. *Dicraneæ*

DICRANUM SCOTTIANUM, *Turn.*

On sandstone rocks in rounded tufts; rather rare. August, September. Journ. Bot., 1874, t. 149.

Sandstone rocks in a park near Chiddingstone.

D. SCOPARIUM, *Hedw.* *D. Dillenii*, Tayl. MSS. (Jenner Tunbr.).

Hedgebanks and heathy places; very common. July, August. Bry. Eur. i., t. 74, 75.

Greenhithe; *George!* Abbey Wood.

D. MAJUS, *Turn.* *D. scoparium* (Jenner Tunbr.).

Shady banks in woods in hilly districts; frequent. July, August. Bry. Eur. i., t. 85.

Abbey Wood; Joyden's Wood; Seal Chart, near Sevenoaks, &c.

This species is known from *S. scoparium* by its larger size, and by having several yellowish fruitstalks proceeding from a single stem.

D. BONJEANI, *De Notaris*. *D. palustre*, Brid. (Wils.; Berk.. Hobk.).

Damp heathy places and shady moist banks; rare. The fruit very rare. August. Bry. Eur. i., t. 79.

Willesboro' Lees; Kings Wood, near Maidstone; Tunbridge Wells; all barren.

D. MONTANUM, *Hedw.*

On decayed stumps of trees; very rare. Not found in fructification in Britain. August. Bry. Eur. i., t. 67.

In spreading bright green patches.

On stumps of *Castanea vesca*, in Abbey Wood, 1874.

First found in Britain, in Warwickshire, on Oak-trees, and at present has only been recorded from that county and from Kent. It resembles *Weissia cirrhata* in appearance when dry, but is easily distinguished from it under the microscope by the strongly serrate margin and back of the nerve of the leaf.

D. FLAGELLARE, *Hedw.*

On decayed stumps of *Castanea vesca*, nearly level with the ground. As yet only found in Kent in this country, and only in the sterile state. (August.) Journ. Bot., 1874, t. 149.

Abbey Wood, sparingly; Bostol Wood, more abundantly, but in one place only.

Somewhat resembles *D. scoparium*, but forms more compact tufts when moist, and when dry is slightly crisped, and each stem then forms a separate tapering head. *D. flagellare*, E.B. 1977 (Forster Tunbr.), is referable to *Campylopus flexuosus*. (See Journ. Bot., l.c.)

CAMPYLOPUS FLEXUOSUS, *Brid. Dicranum flexuosum*, Dill. (Forster Tunbr.; Jenner Tunbr.).

On the earth or on rocks in hilly woods and on subalpine heaths; frequent. December to March. Bry. Eur. i., t. 89.

Abbey Wood, abundant on the ground; Ightham Woods, on sand-rocks; Ashover Wood, on the ground; Keston Common, in damp places.

The Keston Common plant is typical; the other specimens are of a darker colour, and crisped, and probably correspond with the variety mentioned by Wilson as being found near Warrington. (See Wils., p. 90.)

PYRIFORMIS, *Brid. C. torfaceus*, Br. & Sch. (Wils. & Berk.).

On damp sandy or gravelly banks in woods, and in heathy places; frequent. December. Bry. Eur. i., t. 91.

Abbey Wood; Ide Hill, near Sevenoaks; Ightham Woods; Willesboro' Lees, near Ashford. In fruit in all the localities mentioned.

C. FRAGILIS, *Br. & Sch. C. densus*, Br. & Sch. (Berk.).

On dry banks in woods, and on hedgebanks especially in hilly districts; rare. Rarely found in fruit. December. Bry. Eur. i., t. 90.

On decaying Alder stumps near the river Bexley. A very unusual situation for this species.

[*C. brevipilus*, Br. & Sch., which has short hair-points to the leaves, and *C. longipilus*, Brid., which is of a dark green colour and has long hair-points to the leaves, should be looked for in boggy ground in hilly districts.]

Trichostomaceæ.

Tribe 1. *Weissieæ.*

SYSTEGIUM CRISPUM, *Sch. Phascum crispum*, Hedw. (Jenner Tunbr.; Wils.; Hobk.).

On chalky banks; common. Spring and autumn. Bry. Eur. i., t. 12.

Morant's Court Hill; Westerham; *Jenner Tunbr.* Keston Common!; *Howse.* Hayes Common; Maidstone; Shoreham; Dover.

WEISSIA TORTILIS, *Müll. Gymnostomum tortile*, Schw. (Berk.; Wils.; Hobk.).

On chalky banks. April. Rare, or often overlooked. Bry. Eur. i., t. 15.

Wrotham; near Otford, in fructification.

W. VIRIDULA, *Brid. Weissia controversa*, Hedw. (Wils.; Berk.; Hobk.).

Banks; common. November to May. Bry. Eur. i., t. 21.

Greenhithe!; *George.* Wrotham; Halstead; Otford; Hayes Common; Dover; Hythe.

W. MUCRONATA, *Bruch.*

On clayey earth among undershrubs or herbage; rare. December to February. Bry. Eur. i., t. 23.

Forest Hill; *George!* Cliffs between Whitstable and Herne Bay.

EUCLADIUM VERTICILLATUM, *Br. & Sch.* *Weissia verticillata*, Brid. (Wils.; Berk.; Hobk.).

In dripping places on a calcareous soil; rare. July, August. Bry. Eur. ii., t. 40.

Wet sand-rocks, Ightham Woods, abundantly, but of rather stunted growth; in a spring on Kentish rag, Tovil, near Maidstone; not observed with fruit.

This species is readily distinguished when not in fruit by the base of the leaves only being denticulate.

DICRANOWEISSIA CIRRHATA, *Lindb.* *Weissia cirrhata*, Hedw. (Wils.; Berk.; Hobk.; Jenner Tunbr.).

On rails, gates, and trees; frequent in hilly districts. February, March. Bry. Eur. i., t. 25.

Ide Hill, on trees; Westerham; Sevenoaks; Barming, near Maidstone; Postling, on gates; Ashford, on rails; Halstead.

CYNODONTIUM BRUNTONI, *Br. & Sch.*

On subalpine rocks; rare. May, June. Bry. Eur. i., t. 44.

On sand-rocks, Rusthall Common; near Tunbridge Wells; rare.

This species I have referred to *Cynodontium* rather than to *Dicranoweissia* on account of its papillose and serrulate leaves. Probably the plant from Harrison's Rocks mentioned under the name of *Weissia crispula* in Jenner Tunbr. is referable to this plant.

[*Dichodontum pellucidum*, Sch., should be looked for in streams in hilly districts. It occurs within two miles of Tunbridge Wells, in Sussex, on the Frant Road.]

Tribe 2. *Encalypteæ.*

ENCALYPTA VULGARIS, *Hedw.*

In limestone quarries, on wall tops, and more rarely on sandy banks; rare. March, April. Bry. Eur. iii., t. 199.

Cobham, *Mitten!* on a sandy bank, Keston Common, plentifully; *Howse!*

E. STREPTOCARPA, *Hedw.*

On old walls and bridges and limestone banks, and on chalky banks under trees; common. The fruit not observed. August. Bry. Eur. iii., t. 204.

Morant's Court Hill!, &c.; *Jenner Tunbr.* Wye; woods near Charing; exceedingly abundant. Not observed in fructification.

Tribe 3. *Trichostomeæ.*

PHASCUM CUSPIDATUM, *Schreb.*

Fields, wall tops, and hedgebanks; common. Spring and autumn. Bry. Eur. i., t. 5.

Sydenham; *George!*

Near High Elms, Chelsfield; Swalecliff, near Whitstable; Wrotham; Ightham.

P. MUTICUM, *Schreb.* *Sphærangium muticum*, Sch. (Berk.).

Moist banks and fallow fields. Probably generally distributed, but not often noticed. February, March. Bry. Eur. i, t. 4.

Greenhithe; *George!*

P. CURVICOLLUM, *Hedw.* *Cycnea curvicolla*, Berk. (Berk.).
Chalky or calcareous banks, chiefly in hilly districts; frequent. Spring. Bry. Eur. i:, t. 6.
Hill above Westerham; Morant's Court Hill; *Jenner Tunbr.*; Greenhithe!; *George.* Folkestone.

POTTIA RECTA, *Lindb.* *Phascum rectum*, Smith (Wils.; Hobk.); *Bryella recta*, Berk. (Berk.).
Calcareous and chalky banks and fields, especially near the sea. December to February. Bry. Eur. i., t. 6.
Morant's Court Hill! and elsewhere on the chalk; frequent; *Jenner Tunbr.*

P. MINUTULA, *Br. & Sch.* *Gymnostomum conicum.* (Jenner Tunbr.)
Damp banks and fallow fields; frequent. December. to February, Bry. Eur. ii., t. 119.
Fallow fields at Withyham; in the fields between Rusthall Common and the road to the High Rocks; on the bank at Southfield and elsewhere; common on the chalk; *Jenner Tunbr.* Folkestone; Otford; Halstead.

P. STARKEANA, *Müll.* *Weissia Starkeana*, Hedw. (Jenner Tunbr.); *Anacalypta Starkeana*, N. & H. (Wils.; Berk.; Hobk.).
On loose earth in hedgebanks and in cornfields. February, March; not common. Bry. Eur. ii., t. 125.
On the bank near the upper gate of the enclosure of the Calverley estate, on the Pembury road. February, 1842; *Jenner Tunbr.* Greenhithe; *George!*

P. CÆSPITOSA, *Sch.* *Anacalypta cæspitosa*, Br. (Wils.; Berk.; Hobk.).
On bare spots on damp, shady chalky declivities; rare. February. Bry. Eur. ii., t. 126. On a grassy bank near a wood between Otford and Kemsing.
[This species is easily distinguished from *P. minutula* by its yellow fruitstalk and the beaked lid of the capsule.]

P. TRUNCATULA, *L.* *Gymnostomum truncatulum*, Hoffm. (Forster Tunbr.); *Gymnostomum truncatum*, Hedw. (Jenner Tunbr.); *Pottia truncata*, Br. & Sch. (Wils.; Berk.).
Meadows, fields, wall-tops, &c.; common. Spring and autumn. Bry. Eur. ii., t. 120.
Bromley!; *George!* Sevenoaks.

β. *major*, Wils. β. *intermedium*, Turn. (Jenner Tunbr.).
On the bank by the roadside at Southfield Park and elsewhere; *Jenner Tunbr.*

P. LANCEOLATA, *Sch.* *Anacalypta lanceolata*, Röhl. (Wils.; Berk.; Hobk.); *Weissia lanceolata*, H. & T. (Jenner Tunbr.).
On moist limestone or chalky banks and wall-tops. February, April. Bry. Eur. ii., t. 127.
Near Maidstone, on a wall between the bridge and Bowergate; *Jenner Tunbr. Supplt.*
Chelsfield, sparingly; cliffs near Whitstable; Herne Bay, on anthills near the base of the cliffs, abundantly.

P. CAVIFOLIA, *Ehrh.* *Gymnostomum ovatum*, Hedw. (Hobk.); *Pottia pusilla*, Lindb. (Hobk.).
Chalky banks; not common. December, February. Bry. Eur. ii., t. 118.

By the park pales at Teston, plentifully, March, 1844; *Jenner Tunbr.*, Chalky field, Wrotham; above the chalk-pit near Greenhithe Station; near Otford.

This species I have only seen in isolated patches, and have nowhere noticed in Kent the luxuriance of growth which is so marked a feature on mud walls in Buckinghamshire and Oxfordshire.

P. Heimii, *Br. & Sch.* *Gymnostomum obtusum*, Turn. (Forster Tunbr.); *Gymnostomum Heimii*, N. & H. (Jenner Tunbr.).

On banks of marsh ditches and moist places near the sea; probably not unfrequent. April. Bry. Eur. ii., 124.

On banks of the Stour, near Sandwich, abundantly. Also in marshes near Sandown Castle, Deal.

[*P. crinita*, Wils., and *P. Wilsoni*, Br. & Sch., should be looked for on damp cliffs near the sea, during December and January.]

(To be continued.)

SHORT NOTES.

Lavatera sylvestris, *Brot.*—In the Journal for last month (p. 16) there is a short note on the late discovery of *Lavatera sylvestris*, Brot., in the Scilly Isles. It is there stated that the discoverer, Mr. Curnow, first noticed the plant in 1873, and then took it for a distinct-looking variety of *Malva sylvestris*; but in 1876 he saw the plant again, and sent specimens to Mr. Watson, who has determined it to be *Lavatera sylvestris*, Brot. The plant was, in 1876, abundant on a piece of waste ground near Hugh Town, but it is not stated that Mr. Curnow saw it elsewhere; nevertheless he "does not feel sure whether it does not generally take the place of *Malva sylvestris*, or indeed whether the latter occurs in the islands at all." On what grounds he makes this sweeping conclusion it is not stated. When in the islands in 1863, I noticed *Malva sylvestris* in considerable abundance, as stated in my Contributions (Journ. Bot., 1864, p. 108). I then carefully and particularly examined many specimens, especially from the neighbourhood of Hugh Town, from which I have an herbarium specimen. I recollect particularly noting the prostrate as well as the erect form. This is twelve years ago, and though it is quite possible I may have overlooked the *Lavatera*, yet twelve years is time enough for an introduced plant to have spread considerably; and, as Dr. Trimen remarks, the claims of *Lavatera* to be indigenous must be determined by further and careful investigation.—F. Townsend.

Hypericum Sampsoni.—At p. 207 of the last volume of this Journal, Mr. W. B. Hemsley reduces this as a synonym to *H. electrocarpum*, Maxim. He is quite right as to their identity, but he has overlooked two circumstances: the first, that I had myself pointed this out six years ago (Journ. Bot, 1870, p. 275); the second, that whereas M. Maximowicz described his *H. electrocarpum* in May, 1867 (Mél. biolog.

Acad. St. Pétersb. vi., 26), my name and character were published a year and a half previously (Journ. Bot., Dec., 1865, p. 378).—H. F. Hance.

Bud-fertilization in Orchids.—In a short paper of mine in the last volume of the Journal (p. 289), I, strangely enough, omitted from the list of Orchids which have their flowers fertilised while still in the bud, all reference to Mr. Darwin's paper in the "Annals and Magazine of Natural History" for September, 1869. Here we find that there are several other known instances of bud-fertilisation, viz., *Gymnadenia tridentata* and *Platanthera hyperborea* (observed by Asa Gray), *Epipactis viridiflora* (H. Müller), *Schomburgkia*, *Cattleya*, and *Epidendrum spp.* (Crüger), and *Dendrobium cretaceum* (Anderson). It is worthy of remark that the *Vandeæ* are now implicated in the phenomenon in question.—S. Moore.

Carex ericetorum.—Mr. Duthie mentioned to me, about twelve months ago, his finding unlabelled specimens of *Carex ericetorum* amongst duplicates of British plants accumulated by the Edinburgh Botanical Society, which he thought were from the Cambridgeshire locality. These specimens I saw some months ago, and, comparing them with the Gogmagog plant gathered in 1863 by F. A. Hanbury, and subsequently with a specimen included in the herbarium of the late Dr. Joseph Dickson, of Jersey, as *C. præcox* (accompanied by Prof. Babington's ticket, "Gogmagog Hills, Cambridgeshire, May, 1838" *), I found that I could not coincide with Mr. D.'s opinion. The whole tone of the plants was different; whereas the "Edinburgh duplicates" looked as if they had grown where the plant was at home in comfortable quarters, the Cambridgeshire specimens suggest in comparison a plant struggling under difficulties, or a plant upon the fringe of its geographical range. However, I have quite recently discovered and overhauled the bundle from which Mr. Duthie took the three specimens he wrote about. By scattered memoranda I identify it as part of a donation from Sir W. C. Trevelyan to the Botanical Society of unassorted gatherings made by himself in various parts of Britain, and in the bundle I have met with a further specimen of undoubted *C. ericetorum*. This I enclose herewith for inspection. Together with it I found (and together with it I now send) a specimen of a barren *Carex*, which I believe is the same species. You will see that this is passed through a slit in a slip of paper that bears in Sir W. C. T.'s pencil MS. "*Carex pilulifera*" (the specific name afterwards scored through), Milden H. Heath, June 3, 1829." I presume the specified locality to mean the Suffolk Mildenhall, and I would suggest to any botanist resident in that neighbourhood carefully to search likely places during the coming botanical season. No doubt, if necessary, the collector could render from memory some information, but I have not thought it worth while at present to trouble him.—F. M. Webb, January 21.

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* This was the date of its first gathering; "1835," as given in Syme E. Bot., is a typographical error.

Extracts and Abstracts.

The Salicornieæ.

The following is the arrangement of this tribe of *Salsolaceæ* employed by Count Ungern-Sternberg in his paper printed in the "Atti del Congresso Internazionale Botanico" (Florence, 1876).

Microcnemum, *Ung.-Sternb.*, gen. nov.

M. fastigiatum, U.-St. Arthrocnemum fastigiatum, *Losc. & Pardo.* (Arragon, Spain.)

Arthrocnemum, *Moquin-Tandon.*

A. indicum, Moq.-Tand. Salicornia indica, *Willd.* (India, Senegal.)

A. ciliolatum, Bunge. Salicornia brachiata, *Miquel non Roxb.* (Java, Timor, &c.)

A. glaucum, U.-St. Salicornia glauca, *Delile.* S. virginica, *Forsk.* A. macrostachyum, *Moris & Delp.* A. fruticosum, *Moq.-Tand.* (part). (Mediterranean, Canaries, Red Sea, Mexico?)

A. bidens, Nees. (W. Australia.)

A. halocnemoides, Nees. (W. Australia.)

A. Arbuscula, Moq.-Tand. Salicornia Arbuscula, *R.Br.* (S. Australia, Tasmania.)

Salicornia, *Moq.-Tand.*

S. natalensis, Bunge. (Natal.)

S. corticosa, Walp. Salsola corticosa, *Meyer.* Salicornia Gaudichaudiana, *Moq.-Tand.* (Brazil, Cuba?)

S. fruticosa, L. Herb. S. arabica, *L. Sp.* S. radicans, *Smith.* Arthrocnemum fruticosum, *Moq.-Tand.* (part). (S. & W. Europe, Mediterranean, N. & S. Africa, N. Central & S. America, Taiti.) α. *remotiflora.* β. *densiflora.*

S. quinqueflora, Bunge. S. indica, *R.Br. non Willd.* Halocnemum australasicum, *Moq.-Tand.* (Australia, Tasmania, New Zealand?)

S. pachystachya, Bunge. (Madagascar.)

S. brachiata, Roxburgh. (India.)

S. Bigelovii, Torrey. S. virginica, *L.* (part). (N. America.)

S. herbacea, Linn. S. virginica, *L.* (part). S. procumbens, *Smith.* S. ramosissima, S. pusilla, & S. intermedia, *Woods.* S. prostrata, *Meyer.* (Europe, W. & Central Asia, N. & S. Africa, N. America.)

Kalidium, *Moq.-Tand.*

K. gracile, Fenzl. (Mongolia.)

K. caspicum, U.-St. Salicornia caspica, *Linn.* S. arabica, *Pall.* K. arabicum, *Moq.-Tand.* (Russia, Central & West Asia.)

K. Schrenkianum, Bunge. (Siberia.)

K. foliatum, Moq.-Tand. Salicornia foliata, *Pall.* (Russia, Central Asia, Spain??)

Halopeplis, Bunge.

H. pygmæa, Bunge. Salicornia pygmæa, *Pall.* Halostachys songarica, *Schrenk.* (Russia, Central Asia.)

H. amplexicaulis, U.-St. Salicornia amplexicaulis, *Vahl.* S.

nodulosa, *Del.* Halocnemum nodulosum, *Kostel.* Halostachys perfoliata, *Moq.-Tand.* (part). (S.W. Europe, N. Africa.)

H. perfoliata, Bunge. Salicornia perfoliata, *Forsk.* Halocnemum nodulosum, *Moq.-Tand.* (part). (Red Sea.)

H. ? patagonica, Moq.-Tand. (Patagonia.)

HETEROSTACHYS, *Ung.-Sternb.*, gen. nov.

H. Ritteriana, Ung.-St. Halocnemum Ritt., *Moq.-Tand.* (S. America, Haiti.)

HALOSTACHYS, *C. A. Meyer.*

H. caspica, C. A. Meyer. Salicornia casp., *Pall.* Anthrocnemum casp., *Moq.-Tand.* (Caspian, Siberia, Persia, &c.)

HALOCNEMUM, *C. A. Meyer.*

H. strobilaceum, Marsh. Bieb. Salicornia strob., *Pall.* S. ciata, *Forsk.* (S.E. Europe, Siberia, Persia, N. Africa.)

No *Salicorniea* is known as yet from the Asiatic shore of the Pacific Ocean.

THE POLLEN OF CONIFERÆ.

In the recently published "Atti del Congresso Internazionale Botanico tenuto in Firenze," will be found an interesting paper by M. Tchistiakoff on Coniferous pollen, illustrated by two plates. Whether the grains be deprived of or provided with an air-chamber, in both cases the extine is composed of two layers, which are formed simultaneously, by transformation of the 2-layered primordial utricle, where the air-chamber is absent; while in the other condition the layers appear successively, the primordial utricle being here very thin, and the inner portion of the extine being laid down from a peripheral layer of plasma which appears after the formation of the thin outer portion. At each point where an air-chamber is destined to appear is seen an interspace between the two layers of the extine, filled with a small quantity of a gelatinous hygroscopic substance. By expansion of the elastic outer extine-layer the interspaces are converted into vesicles; these are seen to be filled with a watery fluid which soon disappears, and the air-chamber is complete. Meanwhile the several-layered intine has been formed by a secretion of cellulose. The internal changes are precluded by the dissolution of the starch, the contents of the grain becoming transformed into the fovilla; at this time the outer and inner layers of the intine appear more pronounced, and the intermediate ones more or less hygroscopic. The periphery of the fovilla then becomes organised as a new primordial utricle, composed sometimes of a dense, shining, prismatic, pavement-like plasma (of a number of crystalloids, in fact), which is very well seen in *Sequoia*, *Cryptomeria*, and *Cunninghamia*; but in other cases the prismatic structure is less pronounced, or is found only locally on the circumference of the uncrystallised plasma.

The singular phenomenon of division of the plasma occurs either at the same time as or after the appearance of this new primordial utricle, but in such a manner that the latter does not participate in the division. At this point it becomes necessary to deal with three types, in the first of which, the *Thuja*-type (*Cupressus*, *Juniperinus*, *Thuja*, *Cephalotanus*, *Libocedrus*, *Sequoia*, *Cunninghamia*, *Cryptomeria*), the

grains either remain undivided (*Cupressus*), or become divided into two cells (the other genera) by the intercalation of a cellulose wall between two separated plasmatic regions. In the second type (*Larix*, *Gingko*) a second wall is formed, so that the plasma is divided into three cells. The third type (*Pinus*, *Abies*) is subdivided into two; in the first or *Pinus*-form there are one, two, or three cell-walls, the plasma showing either two, three, or four cells (*suspensors*); in the second or *Abies*-form the third suspensory cell, though sometimes touching the preceding cell, may appear isolated from its fellows, and is sometimes found at the other pole of the grain! Moreover this cell is capable of subdivision in all directions. In the formation of the pollen-tube of the *Thuja*-type the prismatic utricle gradually disappears; the intine then swells, and the grains escape from the extine, after which the thick transparent part of the intine is in turn cast off; finally there appears, usually on one of the lateral faces and perpendicular to the longitudinal axis of the grain, the pollen-tube, which is invested by the thin internal layer of the intine. In the formation of the pollen-tube the second smaller cell (when present) is not implicated.

The intine in the *Larix*-type is very thin and not hygroscopic; here the extine splits in its dorsal parts, and allows passage to the pollen-tube, upon which is afterwards seen a small papilla, the "tube germant proprement dit."

The grains of the *Abies*-type usually give origin to two large obtuse excrescences, which almost always appear between the two air-chambers. These excrescences are covered by all the layers of the intine, and the suspensory cells take no part in their formation, as is universally the case. The "tube germant proprement dit" is bounded by the innermost layer of the intine which pierces the other layers.

By retarding germination of the grains of the *Abies*-type, in the middle of the plasma of the excrescence appeared a large nucleus, round which was formed a spherical cell which ultimately became free. The fovilla was also seen to be sometimes divided into a number of spherical cells, each of which had a nucleus with one or two nucleoli.

Millardet with profound sagacity detected the rudiments of a male prothallus in the microspores of *Isoëtes*, the Coniferous homologue of which is undoubtedly the group of suspensory cells. The third of these cells, which has been shown to be sometimes *free in the grain-plasma*, together with its derivatives, M. Tchistiakoff with great plausibility likens to the mother-cells of the antheroids of *Isoëtes*. Looked at in this way, the pollen of Conifers shows some freshly-discovered remarkable points of similarity with the male element of *Isoëtes*, and we may add also of *Selaginella*.

Development of the Flower in Cucurbitaceæ and Plumbagineæ.

Beiträge zur Entwickelungs-geschichte der Blüthe. Von Dr. Ernst Reuther. ("Botanische Zeitung," June and July, 1876.)—This paper contains an account of the development of the flower in *Cucurbitaceæ* and *Plumbagineæ*. With regard to the first Order, several views are advanced different from those ordinarily entertained; thus the

corolla appears to be regarded as a single 5-fid leaf; the five rudimentary andrœcial fibro-vascular bundles not having been seen, are declared to be absent; moreover, unicellular anthers are held to be normal, and the double stamen, instead of being explained as resulting from union of two single ones, is said to be due to increased energy of growth, inducing formation of a connecting tissue; the "disk" of the male flower is looked upon as a pistillar, and that of the female flower as an andrœcial rudiment arising from the base of the style; further, the placentas are held to form a phyllome-cycle alternating with the carpels, the nuclei of the ovules being the tips of these "bases"; also, the outer ovular integument is viewed as a phyllome, and the inner as a trichome. The principal point in the case of *Plumbagineæ* relates to the origin of the ovule. In a very early stage, before the appearance of a trace of an integument, a large cell, the embryo-sac, is seen in the second layer of the periblem of the growing apex. This state is figured, and is very interesting in connection with what is known of the origin of the ovule in *Primulaceæ* and *Hydnoreæ*. Here, as in *Cucurbitaceæ*, the inner integument of the ovule is regarded as a trichome, and the outer as a phyllome.

In some remarks on the foregoing, Prof. Eichler ("Bot. Zeit.," 18th Aug.) reiterates that the five fibro-vascular rudiments are easily to be seen at the base of the Cucurbitaceous andrœcium; he holds also that the two-celled structure is normal for the anthers of this family, though with very many exceptions; that the "disk" of the male flower cannot be a pistillar rudiment, since in both sexes it occupies a similar position, and that the "disk" of the female flower cannot be an outgrowth from the base of the style, seeing that it is quite free from the latter. He also enters a vigorous protest against the "periblematical morphology" which leads one into so fantastic a view as that an axis can produce pollen, announcing a dictum which may well serve as a motto for anti-periblematists. Origin is no absolute criterion in the estimation of morphological value. ("Die Entstehung ist kein Absolutes Kriterium für den morphologischen Wirth.")

Reproduction of the Ascomycetes.

Reproduction des Ascomycetes. Par M. Maxime Cornu. ("Annales des Sciences Naturelles," 1876, p. 53.)—The term "spermatia" has hitherto been applied to conidia-like bodies collected in special cavities, and thought to be incapable of germination. Tulasne had in some instances observed germination of bodies similar to spermatia, but where budding did not result, instead of doubting the perfection of his cultural methods, he believed he had to do with sexual elements, and to these he applied the special term. By adopting a system of culture somewhat similar to that made use of by Van Tieghem and Le Monnier in their researches on *Mucorini*, M. Cornu has succeeded in causing germination of many spermatia. The most satisfactory results were obtained when the nutritive liquid consisted of distilled water with 1 p.c. of sugar and 0·4 p.c. of tannin, though in a few instances simple water was the most advantageous medium of growth. With these results in hand, M. Cornu thinks it permissible to suppose

that all spermatia are capable of germination if a suitable liquid can be found for each case; it becomes necessary, therefore, to consider the relations of spermatia to the similar reproductive bodies known as stylospores and conidia. Their main point of difference from stylospores resides in the fact that the membrane of the latter is usually double, while, unlike conidia, spermatia are collected in special cavities. M. Cornu thinks that terminology is here too exuberant, and he proposes the elimination of the term "conidium," referring thick-membraned conidia to a place among stylospores, and thin-membraned to spermatia. He also, following out Bonorden's suggestions, expresses his belief that certain Mucedines—e g., *Verticillium*, *Acrostalagmus*, *Dendrochium*, &c.—are spermatia-bearing forms of Ascomycetous genera near *Hypomyces*; other Mucedines he would refer to *Peronosporeæ* and *Mucorini*.

With regard to the function of spermatia, M. Cornu shows that, being very small and produced in great numbers, they are capable of causing wide diffusion of the species, the difficulty of germination being an additional advantage in diffusion, since the chances are considerable that before they reach a suitable nidus some time must elapse, during which they may be transported by the agency of winds, birds, &c.

Some natural cultural experiments were also conducted, spermatia being sown on the host with successful results in a few cases.

The brilliant work of Van Tieghem and Brefeld has demolished the pollinodium-and-ascogonium theory, and the last corner in which sexuality of the higher Fungi was supposed to lurk has now been swept clear by Cornu; still we confess to some reluctance in finally regarding such comparatively advanced forms as reproduced entirely by sexual means; it is perhaps still possible that a thorough re-examination of the mycelium may lead to the discovery of some sexual arrangement which has hitherto escaped detection.

Botanical News.

Articles in Journals.—December, 1876.

Grevillea.—M. C. Cooke and J. B. Ellis, "New-Jersey Fungi" (contd.).—M. C. Cooke, "New British Fungi."—W. A. Leighton, "Lichens of Fishguard, Pembrokeshire."

Œsterr. Bot. Zeitschr.—A. Kerner, "On *Paronychia Kapela*."—L. Celakovsky, "Remarks on some *Paronychiæ*."—J. Freyn, "On some Austro-Hungarian plants" (contd.).—M. Staub, "On *Centaurea Sadleriana*, Janka."—C. Haussknecht, "On *Cerastium Haussknechtii*."—F. Hauck, "Remarks on some *Rhodophyceæ* and *Melanophyceæ* in Reinsch's 'Contributiones ad Alg. et Fung.'"—F. Antoine, "Botany at the Vienna Exhibition" (contd.).

Flora.—H. Wydler, "On some cases of dichasial and sympodial branching in vegetative axes."—F. Hildebrandt, "On the runners of *Trientalis europæa*."—J. Müller, "Rubiaceæ Brasilianæ novæ"

(contd.).—W. Nylander, "*Collemacei*, *Caliciei*, *Cladoniei*, and *Thelotremei* Cubanæ novæ."—F. Arnold, "Lichens of the French Jura" (contd.).—F. de Thümen, "Fungi Austro-africani" (contd.).—W. Nylander, "Addenda nova ad Lich. Europæam" (8 new British species).

Bot. Zeitung.—J. F. Fückel, "On the seed-coat of some *Cucurbitaceæ*" (contd.).—O. Drude, "On the separation of the Palms of America from those of the Old World."—J. Schuch, "Is Ivy the only native plant which forms aërial roots?"—L. Sautermeister, "On *Exidia recisa*, Fr."

Journ. Linn. Soc. (No. 87, Dec. 15).—T. H. Potts, "Habits of Ferns near Canterbury, New Zealand."—S. H. Vines, "On the digestive ferment of *Nepenthes*."—J. M. Crombie, "Lichens of Rodriguez collected by I. B. Balfour."—W. Archer, "Note on Freshwater Algæ collected by H. N. Moseley in Kerguelen Land."—Id., "Freshwater Algæ coll. in Torres Straits, coast of Japan, and Juan Fernandez."—M. T. Masters, "Remarks on 'superposed' arrangement of the flower."—Kirk, "Note on specimens of *Hibiscus* allied to *H. Ros-sinensi*."

Botaniska Notiser (18th Dec.).—S. Berggren, "Development of the prothallium and embryo in *Azolla*."—E. Warming, "On the ovule of *Ceratozamia*."—Id, "Review of Danish botanical literature for 1875-6."

Trans. Bot. Soc. Edinburgh, 1875-6 (vol. xii., pt. 3).—A. S. Wilson, "Observations and experiments on Ergot."—A. Dickson, "On Monstrosities of *Primula vulgaris* and *Saxifraga stellaris*."—M. T. Masters, "On the Hungarian Oak (*Q. conferta*, Kit) as cultivated in the Botanic Garden, Edinburgh" (tab. 7).—A. S. Wilson, "Experiment with Turnip seed."—T. A. G. Balfour, "On Darwin views of climbing plants."—R. Christison, "On the effects of *Erythroxylon Coca* leaves."—Id, "On a tree struck by lightning" (tab. 8, 9).—W. R. McNab, "On the synonymy of certain species of *Abies*."

New Books.—Willkomm and Lange, "Prodromus Floræ Hispanicæ," vol. iii., pt. 2 (Stuttgart, 12s.).—Franchet and Savatier, "Enumeratio Plantarum in Japonia sponte crescentium," vol. ii., pt. 1. (Paris.)—L. Just, "Botanischer Jahresbericht," 1875, pt. 1. (Leipzig.)—G. L. Goodall and J. Sprague, "Wild Flower, of America," pt. 1. (Boston, Mass., 5 doll.)

The recently published parts of the great "Flora Brasiliensis" are Fasc. 70, containing the *Leguminosæ Mimoseæ*, by Bentham; and Fasc. 71, consisting of the *Ochnaceæ*, *Anacardiaceæ*, *Sabiaceæ*, and *Rhizophoreæ*, by Engler.

Maximowicz has another, the 20th, instalment of his "Diagnoses" of Japanese and Manchurian plants in the "Bulletin" of the St. Petersburg Academy of Sciences (t. xxii., pp. 209-264). A new genus of Urticeæ, *Sceptrocnide*, is described, and several of Col. Przewalski's gatherings are included.

The Bedfordshire Nat. Hist. Soc. and Field Club has issued its

first volume of "Abstract of Proceedings." In Botany Mr. Hillhouse reprints his "Contributions" towards a Flora of the county, and also has a paper on its surface geology and physical conditions, with a map of resulting botanical district. We note with satisfaction that the Duke of Bedford has made a donation of £25 towards the botanical survey of the county.

Friedrich Wilhelm Schultz died at Weissenburg, Elsass, on December 30, 1876. He was born at Zweibrücken, in the Pfalz, on January 3, 1804, and was a brother of the late Dr. C. H. Schultz, the synantherologist, who took the title of "Bipontinus" from his native town. F. Schultz (for he dropped his second name Wilhelm in his botanical writings after 1844) at first lived at Munich, whence he dates his paper on the German species of *Orobanche* in 1829. He soon returned to his native country, and resided in the small town of Bitche till 1853, when he removed to the neighbouring town of Weissenburg. It is mainly in connection with the Flora of the Palatinate and of Elsass that his name will be always associated, for he studied the plants of this district with minute attention during nearly half a century, and published much critical matter upon them. Of his important series of Exsiccata the first, the "Flora Galliæ et Germaniæ exsiccata," was commenced in 1836, and a Century continued to appear annually till 1852; and the second, the "Herbarium normale," was continued from 1856 to 1869. In these undertakings he was assisted by a large number of the best French and German botanists, including the late M. Billot, whose own "Exsiccata" (intended as a supplement to Schultz's) commenced in 1846. Along with the "Fl. Gall. et Germ. exs." was issued the "Archives de la Flore" in sheets, at intervals from 1842 to 1854, and afterwards as "Archives de Flore" in more regular form from 1854-1869. This contains much careful work in critical discrimination. F. Schultz took a prominent part in the foundation of the Naturalists' Society, Pollichia, in 1840, and contributed many papers to its yearly Transactions. In 1846 he published his "Flora der Pfalz," and additions to this were printed in 1859. There are also numerous papers by him on the plants of his native country in the Regensburg "Flora." As a "critical" local botanist he must be considered to have occupied for many years a prominent and influential position.

The Chair of Botany in the University of Aberdeen has become vacant by the retirement of Prof. Dickie. There are, we understand, a number of candidates for the post, including Dr. I. B. Balfour, Dr. R. Brown, the Rev. J. M. Crombie, Prof. W. R. McNab, and Dr. J. W. H. Trail.

The death is announced of Alfred Smee, F.R.C.S., F.R.S., in his sixtieth year. He was surgeon to the Bank of England, a chemist of some repute, and for many years an enthusiastic naturalist of the semi scientific stamp. As an author in botanical subjects he is known by his pamphlet on the Potato-disease, published in 1846, and by his elegant volume, "My Garden," which appeared two or three years back.

On January 12th died the celebrated botanist W. F. B. Hofmeister, Professor at Tübingen. Particulars of his life and work must be deferred till next month.

Original Articles.

DESCRIPTIVE NOTES ON A FEW OF HILDEBRANDT'S EAST AFRICAN PLANTS.

By J. G. Baker, F.L.S., and S. Le M. Moore, F.L.S.

[Tab. 185.]

The plants collected in Eastern Tropical Africa and the Comoro Islands by Dr. Hildebrandt have been distributed during the last few years, and from a set purchased by the Kew Herbarium, we have selected a few of the most striking species for description. Dr. Hildebrandt's collections are extremely interesting, and include a new (the second known) dicœcious *Buxus* (*B. Hildebrandtii*, Baill.) from Somali Land, and from the same country the singular Convolvulaceous genus *Hildebrandtia* described by Dr. Vatke.* Prof. H. G. Reichenbach † has also described a new *Balanophora* (*B. Hildebrandtii*) from the Comoro Islands, and *Holothrix Vatkeana* from Somali Land. It is to be hoped that we shall some day have a full account of the entire series of gatherings.

Clathrospermum biovulatum, *S. Moore*, n.sp.—Caule gracili divaricato cortice cinereo striato glabrescente lenticellifero induto, foliis breviter petiolatis membranaceis ovato-oblongis obtusis basi truncatis glabris supra nitentibus subtus pruinoso-pallidis, $1\frac{3}{4}$-4 unc. (Angl.) long. 1-$1\frac{3}{4}$ unc. lat., petiolis transversim corrugatis puberulis $\frac{11}{12}$-$\frac{1}{6}$ unc. long., floribus parvis hermaphroditis pedicellatis exaxillaribus (interdum foliis oppositis) solitariis vel binis, pedicellis gracillimis infra medium minute bracteolatis puberulis $\frac{1}{3}$-$\frac{1}{4}$ unc. long. (ætate longioribus ac robustioribus), calyce minuto cyathiformi brevissime trilobo lobis puberulis, petalis exterioribus oblongis obtusis $\frac{1}{6}$-$\frac{1}{4}$ unc. long. interioribus panduriformi-spathulatis æstivatione mox disjunctis, staminibus (in floribus examinatis omnibus) 6 antheris oblongis a latere dehiscentibus connectivo lato truncato exhibientibus, carpellis 7 angustis puberulis stigmatibus sessilibus lineari-oblongis coronatis, ovulis quoque in ovario 2 superpositis, fructibus 2-5-nis apiculatis nitidis 1-vel 2-spermis in statu 2-spermo toruloso-constrictis, seminibus oblongis, $\frac{1}{3}$ unc. long. testa tenui fulva munitis.

Hab.—Ad litt. maris juxta Bagamōso regione Zanzibarica. No. 1294!

There are specimens of this in the Kew Herbarium, collected by Dr. Kirk at Mombasa.

The genus has hitherto consisted of two species, natives of Guinea. The nearest ally of the present plant is *C. Vogelii*, from which it is

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* See Journ. Bot., 1876, p. 313.

† See Journ. Bot., 1876, pp. 45, 346.

distinguished by its oblong (not broadly elliptical) outer petals, hexandry, and pistil with seven 2-ovulate carpels. The reticulation on the leaves is also somewhat more conspicuous here than in *C. Vogelii*.

TRIUMFETTA ACTINOCARPA, *S. Moore*, n.sp.—Ramis gracilibus teretibus primo obscure furfuraceo-puberulis subnitentibus mox albidis glabris longitudinaliter striatis, stipulis setaceis demum deciduis vix $\frac{1}{12}$ unc. long., foliis longe-petiolatis ovatis vel ovato-rotundatis dentato-serratis supra furfuraceo-pubescentibus subtus albo-tomentosis $\frac{1}{4}$-$\frac{1}{2}$ unc. long., petiolis laminam subæquantibus furfuraceis, gemmis oblongis, floribus breviter pedunculatis ad apices ramulorum axillaribus terminalibusve, sepalis linearibus apice apiculatis nonnunquam bifidis extus tomentosis $\frac{1}{4}$ unc. long., petalis spathulatis emarginatis vel bifidis $\frac{1}{6}$ unc. long., staminibus indefinitis (circiter 25), ovario 2-loculo? villoso, fructu globoso (ut apparet) indehiscenti setis elongatis stellatim pubescentibus apice debiliter uncinatis copiose munito.

Hab.—In Mont. "Ahlgebirge" dictis ditione Somalensi, 1500 met. No. 882! Frut. dens. 1 met. alt.

I am sorry that, owing to the rotten state in which the flowers are, I was unable to make out the structure of the ovary in a satisfactory manner. The species has a good deal of the facies of *T. Kirkii*, Mast., from which it is abundantly different.

The setæ of the fruit are scented somewhat after the manner of *Chimonanthus* flowers, and I cannot but think that the scent may be advantageous by driving away insects. Suspecting that there must be some meaning for the scent, I placed a few ants in an open box which contained two of the fruits; the aversion of the ants was most marked, as in walking round the box they would hasten to give the fruits a wide berth, and the same was the case when the position of the fruits was altered; moreover, whenever an ant found its way to the edge of the box, it was only necessary to bring a fruit near it in order to drive it back again. Now the ordinary spinous *Triumfetta* fruit seems eminently adapted to ensure diffusion by means of passing animals; but there are a few species (among which is included *T. actinocarpa*) which have the fruit covered with numerous long, thin, spineless, or almost spineless, setæ, and this arrangement would appear to favour diffusion by wind-agency. We can see, therefore, that it might be of great advantage to the latter sort of fruit to possess some means of repelling any gnawing insect whose ravages might go so far as to strip it entirely of its special aid to diffusion. This is probably the explanation of the scent.

A few other species have scented setæ; thus in *T. trichocarpa*, Sonder, from the Cape of Good Hope, they are considerably longer and coarser than in the Somali plant, but the scent is not so powerful, and the same may be said for two Australian species, *T. plumigera*, F. Muell., and a fine north-western form in the Kew Herbarium, which, in the absence of flowers, still remains undescribed. I have not found a scented fruit in any American species. I have ascertained also that ants do not at all like the scent of *Chimonanthus* flowers, and I would suggest that in some cases a strong scent may be useful to a flower by driving away insects which cannot aid in its

fertilisation. With regard to *Chimonanthus*, which flowers at a time when ants are dormant, the scent may perhaps be regarded as an inheritance from later-flowering ancestors. This is a subject which seems worthy the attention of Fritz Müller.

Grewia ectasicarpa, *S. Moore*, n.sp. (tab. 185, fig. 2).—Ramis teretibus glabrescentibus, ramulis junioribus tomentosis, foliis breviter petiolatis trinerviis oblongis vel ovato-oblongis cuspidulatis inæqualiter dentatis supra scabridis subtus stellatim pubescentibus $\frac{1}{2}$ unc. long., petiolis $\frac{1}{12}$-$\frac{1}{6}$ unc. long. tomentosis, cymis foliis superioribus oppositis atque iis brevioribus tomentosis, sepalis linearibus obtusiusculis extus tomentosis margine albidis prope $\frac{1}{3}$ unc. long. petalis oblongis irregulariter dentatis vel undulatis vix duplo longioribus, toro circiter $\frac{1}{8}$ unc. long. pubescente, ovario subgloboso villoso 2-loculo (an semper ?) loculis 2-ovulatis, stigmato 2-lobulato drupo plerumque 2-pyreno pyrenis spurie 2-loculis oblongis divergentibus hispidulis.

Crescit in ins. Zanzibar in vallib. humid. atque ad litt. maris. No. 1117 ! 4 met. alt.

Boswellia neglecta, *S. Moore*, n.sp. (tab. 185, fig. 1).—Caule tereti robusto cortice cinereo longitudinaliter sulcato lenticellifero glabro cincto, foliis ad apices ramulorum brevium congestis plerumque 8-10-jugis $\frac{3}{4}$-$1\frac{1}{2}$ unc. long. hirsuto-pubescentibus, foliolis oblongis obtusis $\frac{1}{12}$-$\frac{1}{6}$ unc. long. (foliolo ultimo interdum paullo majore), paniculis axillaribus (an interdum etiam terminalibus ?) paucifloris folia subæquantibus pubescentibus, bracteis oblongis pubescentibus circiter $\frac{1}{12}$ unc. long., pedicellis calyce longioribus, calycis segmentis triangularibus acutis pubescentibus, petalis oblongis calycem duplo superantibus dorso pilosulis $\frac{1}{8}$ unc. long., staminibus 10 filamentis basi magnopere dilatatis glabris antheris obscure papillosis, capsula immatura trigona basi angustata.

In Mont. "Ahlgebirge" dictis 500 met. No. 1508 ! Arbor 5-6 met. alt. Nom. vernac. Múrlo.

The structure of the Burseraceous stem has been investigated by M. Marchand (Baillon's Adansonia, vols. 7 & 8). He finds the resin in the roots, leaves, flowers and fruit; but in most quantity in the bark, round which latter the main structural interest collects. A section of the bark-structures of a first year's shoot of *Balsamodendrum Opobalsamum* shows a festoon of liber-cells alternately convex and concave, the internal concavities being occupied by large tubes filled with air, and this liber-zone is plunged in the midst of cellular tissue containing much resin, outside which are the suberous and epidermal layers. The bark of a second or third year's stem of *B. Myrrha** shows from without inwards, firstly, an epidermal layer; secondly, a layer of cells filled with resin; thirdly, a layer of empty cells followed by sap-filled ones; after which is found the undulated liber-zone with air-canals in the internal concavities; and lastly, cellular tissue filled with paler-tinted resinous matter. The successive casting-off of the external layers is shown by *B. africanum*. The bark of this species is formed of an outer zone of empty cells (pseud-epidermis of Marchand), followed by a pretty thick region of cellular tissue still containing traces of gum-resin, after which comes a layer

* Probably *B. Berryi*, Arn., an Indian plant.—[*Ed. Journ. Bot.*]

of resin-gorged cells in which the undulated liber-zone is plunged; this is followed by a series of air-canals, inside which is seen a second layer of resiniferous cells, and then a second liber-zone in course of formation accompanied by a second series of air-canals. M. Marchand shows that splitting of the bark takes place along the line of the air-canals, the cells of the outer portion of the parenchymatous mass in the midst of which the liber-zone is plunged now losing their resinous contents and becoming the "pseudepidermis."

The structure of the bark of *Boswellia neglecta* (fig. d) is somewhat different. Starting from without inwards one sees first a false suberous layer, in which are plunged liber-layers and air-canals (s, a^1, l^1). Then there is a mass of rounded cells filled with resin, succeeded by a great number of more or less transversely extended resiniferous cells, among which are air-canals and layers of liber (b); the latter are not undulated as in the cases figured by M. Marchand, but they extend round the stem in interrupted circles; sometimes, indeed, isolated liber-cells are met with (o). The air-canals resemble those already alluded to, but they do not correspond in number to the liber-layers, neither are they always ranged one behind the other as shown in the figure. If this latter be examined, it will be seen that there are five liber-zones and three air-canals with a large cell, which may perhaps be an air-canal in a rudimentary condition. It is evident that in this species there is a general movement of the tissues towards the outer portion of the stem; where, when any of the parenchyma-cells have arrived, being no longer subject to much pressure, they become expanded, and yielding up their resin, pass off to form part of the false suberous zones, and in this outward progress they are accompanied by air-canals and liber-layers. A study of the periodical growth of these tissues, and a general examination of the stem-structure in this family, would certainly yield results of great interest.

SEBÆA OLDENLANDIOIDES, *S. Moore*, n.sp.—Herba 9-12 pollicaris caule erecto subtereti lævi fistuloso, foliis subsessilibus lineari-lanceolatis acutis integris 3-nerviis glabris 1-1½ unc. long., cymis numerosis paucifloris, calycis segmentis 5 lanceolatis dorso latiuscule alatis apice breviter apiculatis ⅛ unc. long., corollæ tubo calycem subæquante limbo 5-lobo lobis late-oblongis obtusis, antheris rectis oblongis apice eglandulosis, ovario ovoideo crustaceo glabro 2-loculo, stylo brevi crasso, stigmate obscure bilobulato, capsula globosa.

Hab.—In pratis siccis ins. Zanzibar. No. 1131!

TRICHODESMA HELIOCHARIS, *S. Moore*, n.sp.—Caule lignoso erecto divaricato lanato-tomentoso demum pubescente, foliis alternis hac atque illac congestis sessilibus oblongo-linearibus acutiusculis basin versus angustatis albide strigoso-hirtis ¼-½ unc. long. circiter $\frac{1}{12}$ unc lat., calyce basi 5-angulato inauriculato segmentis linearibus strigoso-villosis ¼ unc. long., corollæ sinubus planis lobis tubum circiter 6-plo superantibus lineari-lanceolatis cæruleis, antheris glabris dorso carinatis additamentis loculis dimidio longioribus, ovarii lobis e gynobasi leviter convexa prominentibus, nuculis oblongis leviter triquetris ad latera glochidiatis facie inferiore gynobasi adnatis.

Hab.—Ad "Serrusgebirge" ditione Somalensi, 1800 met. No. 1417!

ÆOLANTHUS ZANZIBARICUS, *S. Moore*, n.sp.—Caule debili glabrato

epidermide pallido laxiuscule induto, foliis ovatis obtusis dentato-crenatis puberulis basi in petiolum laminam sæpissime subæquantem angustissime decurrentibus 1¼-2 unc. long. ¾-1 unc. lat., cymis foliis multototies longioribus trifidis pubescentibus, bracteis parvis fugaceis late-oblongis pubescentibus, calyce anguste campanulato truncato pubescente ⅛ unc. long. basi persistente 1/24 unc. long. glabrescente, corolla extus obscure puberula, antheris oblongis, nuculis ovoideo-oblongis nitentibus.

Hab.—Ad Bagamōso ditione Zanzibarica. No. 1265!

When the upper part of the calyx is detached, it appears to draw the nutlets up along with it; this is perhaps a method to ensure dispersion of the fruits.

Tinnea heterotypica, *S. Moore*, n.sp. (tab. 185, fig. 3).—Caule subtereti lignoso albido, ramulis junioribus obscure puberulis mox glabris, foliis (in exemplario nostro) oppositis longe-petiolatis subcarnosulis ovatis vel ovato-deltoideis obtusis basi late truncatis grosse crenato-dentatis glabrescentibus supra subnitentibus subtus pallidioribus et purplurimas glandulas immersas ostendentibus lamina ½-⅓ unc. long. ½-1¼ unc. lat., petiolis laminam longitudine subæquantibus obscure puberulis, floribus in racemis foliis longioribus laxiuscule dispositis, bracteis subulatis rigidis apice plerumque eviter recurvis circiter 1/12 unc. long., pedicellis bracteis æquilongis bracteolis 2 setaceis prope 1/24 unc. long. juxta medium munitis, calyce tubuloso-campanulato 1/10 unc. long. labiis bifidis obscure puberulis, corollæ tubo calycem 3- vel 4-plo superante gracili superne leviter ampliato, filamentis crassis a latere compressis ciliolatis, antheris exsertis, stigmatis lobo altero pro genere usitato alterum parvum subulatum circiter 5-plo superante, placenta omnino ut in *T. æthiopica*, Kotsch. & Peyr.

Hab.—Crescit in "Ahlgebirge" Somalensium, 1400 met. No. 1429! Suffrutex 5 met. alt.; flores purpurei.

This will serve as the type of a new section of the genus, characterised primarily by the racemose inflorescence. The long-petioled leaves, narrow corolla-tube, exserted stamens and stigma with one of the lobes still remaining as a subulate rudiment, are additional points which may possibly be found of sectional value.

The two bracteoles on the pedicel in this genus are, without doubt, rudiments of bracts of aborted flowers, as was recently shown by some shoots of *T. æthiopica* flowering at Kew, on which were occasionally to be seen small floral rudiments in the axils of the bracteoles.

Barleria Hildebrandtii, *S. Moore*, n.sp.—Caule divaricato lignoso tereti, glabrescente, ramulis junioribus dense albido-tomentosis pilis strigosis flavidis conspersis, foliis oblongis obtusiusculis stellatim albido-tomentosis subtus nervosis nervis pilis strigosis flavidis munitis ½-¾ unc. long. ¼ unc. lat., floribus (in nostris exemplariis) perpaucis in axilla suprema positis, bracteis bracteolis segmentisque calycis dense barbato-ciliatis, bracteolis oblongis ⅓ unc. long., calycis segmentis exterioribus subæqualibus oblongis obtusiusculis vel bifidis bracteolas subæquantibus interioribus subulatis exterioribus paullo minoribus, corolla extus puberula tubo gracili ⅓ unc. long. limbo (ut apparet) regulari ⅔ unc. diam. lobis obovatis emarginatis, staminibus fertilibus 2 filamentis subulatis puberulis, staminodiis 2 minimis, stylo obtuso.

Hab.—In Mont. "Ahlgebirge," 1500-2000 met. No. 866! "Frutex" densis 0·5 met. alt.

A well-marked variety of this species, without the coarse yellow hairs interspersed through the stellate tomentum on the ramuli and nerves of the leaves, and with the latter organs thicker and merely pubescent on their upper surface, was collected by Dr. Kirk on the Tola river, Somali coast.

ISOGLOSSA BARLERIOIDES, *S. Moore*, n.sp.—Caule subtereti crispe pubescente, foliis oblongis vel oblongo-ovatis obtusis basi in petiolum brevem angustatis pubescentibus subtus pallidioribus 1-1¼ unc. long. vix ½ unc. lat., floribus in spicas terminales folia plerumque circiter duplo superantes confertis, bracteis foliaceis late obovatis acutis ½-¾ unc. longis glanduloso-puberulis, bracteolis calycisque segmentis subulatis ciliolatis his illis duplo longioribus, corolla extus pubescente tubo prope ½ unc. long. basi et fauce ampliato labio postico ovato-oblongo integro antico 3-lobo lobis oblongis obtusis, staminibus juxta faucem corollæ insertis antheris oblongis subparallelis uno loculo paullo altiore, stigmate obscure bifido, capsula stipitata ovata cuspidata puberula 2-sperma, seminibus compressis rotundatis leviter tuberculatis.

Hab.—In Mont. "Serrusgebirge." No. 1401! Suffrutex, 0·5 met. alt. Floribus lacteis.

SERICOCOMA PALLIDA, *S. Moore*, n.sp.—Caule lignoso tereti ciner o-puberulo ramulis foliosis crispe albido-tomentosis, foliis oblongis vel oblongo-ovatis obtusis vel leviter emarginatis ¾-1½ unc. long. ½-¾ unc. lat. primo utrinque albido-tomentosis deinde puberulis, spicis (in nostro exemplario) foliis subæquilongis tomentosis, bracteis inæqualibus ovatis vel ovato-rotundatis obscure mucronulatis 1-nerviis extus tomentosis ⅙-1/12 unc. long., perianthii segmentis lanceolatis ⅕ unc. long. villosulis, androecio perianthio multototies breviore staminodiis oblongis obtusis interjectis, stylo recto, micropylo superiore.

Hab.—In Mont. "Ahlgebirge," 1200 met. No. 1521!

SERICOCOMA SOMALENSIS, *S. Moore*, n.sp. (tab. 185, fig. 4).—Caule stricto tereti pallido, ramulis junioribus puberulis deinde glabris, foliis oppositis obovatis vel obovato-oblongis obtusis scabride pubescentibus ⅓-½ unc. long. ¼-⅓ unc. lat., petiolo ⅛ unc. longo, spicis pendulis crispe pubescentibus 6 unc. long. gracilibus, bracteis ovatis acutis vel cuspidulatis scariosis dorso sericeo-pilosulis circiter 1/12 unc. long., perianthii segmentis subæqualibus subulato-linearibus ⅓ unc. long. dorso villoso-plumosis, androecio perianthio dimidio breviore staminodiis nullis interjectis filamentis latis subulatis glabris, ovario ovato leviter stipitato, stylo recto, stigmate capitato, micropylo inferiore.

Hab.—In Mont. "Ahlgebirge," 1100 met. No. 1519! Frutex 3 met. alt.

According to Moquin-Tandon's clavis of genera, this should perhaps go with *Trichinium*, though the opposite leaves would separate it from the great mass of species of that genus. We have Mr. Bentham's authority for the view that the presence or absence of teeth (staminodia) to the staminal tube is not a character of generic importance in the classification of Amaranths. The micropyle of *Sericocoma* is said to be always superior, but I do not think it would be safe to establish a new genus for the present plant on

account of its inferior micropyle. Further, the position of the latter depends, I think, on the comparative heaviness of the ovule and length and strength of the funiculus, and is not contingent on true turning of the ovule itself.

ANTHERICUM (*Phalangium*) CORYMBOSUM, *Baker*, n.sp.—Fibri radicales breves cylindrici dense cæspitosi, collo radicis fibris setosis cincto, vaginis interioribus membranaceis. Folia 5-6 erecta anguste linearia glabra 2-3 poll. longa, basi 1 lin. lata, ad apicem acuminata, marginibus minute ciliatis. Scapus simplex gracilis pollicaris. Racemus corymbosus 3-4-florus, pedicellis solitariis ascendentibus, inferioribus 6-9 lin longis, bracteis lanceolatis cuspidatis 3-4 lin. longis. Perianthium album 4-4½ lin. longum, segmentis oblanceolatis, dorso viridibus laxe 3-5-nervatis. Stamina perianthio paullo breviora, antheris 1 lin. longis, filamento glabro leviter applanato triplo brevioribus. Stylus filiformis glaber 2-2½ lin. longus.

Hab.—Somali Land ad rupes calcareas, alt. 5000-6000 pedes. No. 1471.

ANTHERICUM (*Phalangium*) INCONSPICUUM, *Baker*, n.sp.—Fibri radicales graciles dense cæspitosi 2-3 poll. longi; vaginis exterioribus fibroso-membranaceis. Folia producta 3-4 anguste linearia graminoidea glabra acuminata semipedalia 1 lin. lata, venis crebris perspicuis 12-15. Scapus gracilis 1-2-pollicaris. Racemus simplex laxissimus 2-3-pollicaris, internodis inferioribus 9-15 lin. longis, bracteis superioribus minutis deltoideis, inferioribus lanceolatis pedicello æquilongis, pedicellis ascendentibus, inferioribus geminis inæqualibus, longioribus 3-4 lin. longis. Perianthium album 1 lin. longum, segmentis lanceolatis dorso viridibus laxe trinervatis. Stamina perianthio paullo breviora, antheris oblongo-globosis filamento glabro 3-4-plo brevioribus.

Hab.—Somali Land, alt. 6000-7000 pedes. No. 1469!

DRACÆNA SCHIZANTHA, *Baker*, n.sp.—Arbor 8-metralis, dichotomiter ramosa. Folia ignota. Panicula deltoidea sesquipedalis copiose tripinnata, ramis crassis patulis pallidis puberulis, pedicellis 1 lin. longis puberulis medio articulatis 2-4-natis vel superioribus interdum dense congestis, bracteis minutis deltoideis. Perianthium album 2½ lin. longum, tubo brevi campanulato, segmentis lanceolatis. Genitalia inclusa. Filamenta lanceolata 1½ lin. longa, antheris oblongis. Ovarium oblongum; stylus ovario æquilongus, stigmate capitato.

Hab.—Somali Land, alt. 2500-5500 pedes. No. 1472! Moli incolarum.

Remarkable for its downy rachises, densely-crowded small flowers, and very short perianth-tube. Unfortunately we have no leaves.

CYATHEA HILDEBRANDTII, *Kuhn* in "Index Sem. Hort. Berol," 1875, p. 20.—Arbor 5-metralis. Lamina ampla deltoidea tripinnata modice firma glabra supra viridia infra distincte glauca, rachibus primariis et secondariis calvis. Pinnæ oblongo-lanceolatæ sesquipedales et ultra. Pinnulæ sessiles lanceolatæ acuminatæ 3-4 lin. longæ, basi 8-9 lin. latæ, segmentis tertiariis ligulatis obtusis 1 lin. latis. Venæ segmentorum 9-10-jugæ, supremæ exceptæ profunde furcatæ. Sori confertæ costulares vix supra medium segmentorum producti, involucro parvo persistente campanulato ore truncato.

Hab.—Ad insulam Johanna, alt. 2500-4500 pedes. No. 1747!

A well-marked plant, differing from *C. excelsa* by the glaucous

under surface of its fronds and involucre regularly cup-shaped, like that of *C. arborea*.

Polypodium (*Eupolypodium*) comorense, *Baker*, n.sp.—Caudex breviter repens, paleis parvis lanceolatis castaneis dense vestitus. Stipites erecti subcæspitosi graciles erecti 2-5 poll. longi, pilis patulis brunneis mollibus gracillimis 1 lin. longis dense vestiti. Lamina lanceolata simpliciter pinnata viridia glabra modice firma 6-12 poll. longa medio 1-2 poll. lata. Pinnæ 20-40-jugæ lanceolatæ confertæ basi late adnatæ, centrales 6-12 lin. longæ, basi 3-4 lin., medio 2-2½ lin. latæ, inferiores paullo minores. Venulæ pinnarum erecto-patentes furcatæ. Sori ad pinnam 8-12-jugæ globosi, superficiales inter costam et marginem mediales.

Hab.—Ad insulam Johanna, alt. 3000-5000 pedes, ad arbores. No. 1788!

Near *P. pendulum*, Sw., and *P. suspensum*, Linn., of Tropical America.

Explanation of Tab. 185.

Fig. 1. *Boswellia neglecta*.—A branch with leaves and flowers.—*a*. flower; *b*. section of the same; *c*. a stamen (all magnified); *d*. section of bark and part of wood (Hartnack no. 8 objective, 2 eyepiece); here *s* is the false suberous zone; *b*. bark; *c*. cambium; *w*. ultimate wood-zone, and *W*. penultimate wood-zone; in the bark a^1 to a^3 are the air-canals; a^4 is a supposed rudimentary air-canal; *l* to l^5 mark the five liber-zones, and at *o* is shown a solitary liber-cell.

Fig. 2. *Grewia ectasicarpa*.—Fruit (nat. size).

Fig. 3. *Tinnea heterotypica*.—Upper part of style and stigma (magnified).

Fig. 4. *Sericocoma somalensis*.—Ovary, &c. (magnified).

ON THE CLASSIFICATION OF MONOCOTYLEDONS: A HISTORICAL CRITICISM.

By G. S. Boulger.

In 1774 Antoine-Laurent de Jussieu divided Monocotyledons into Hypogynia, Perigynia, and Epigynia, according to the insertion of the floral whorls.* This scheme, with the Perigynia merged in the Epigynia, is the basis of that adopted by Dr. Hooker in the Appendix to the English edition of Le Maout and Decaisne.† In 1830 Lindley divided them into Petaloideæ and Glumaceæ, according to the nature of the perianth;‡ in 1843 Brongniart grouped them as albuminous and exalbuminous, including in the latter the *Orchideæ* and *Fluviales*, and further dividing the former into three groups according to the nature of the "albumen" and perianth.§ In the scheme first propounded in the following year by Adrien de Jussieu, son of Antoine-Laurent, the primary division, into albuminous and aquatic and exalbuminous,

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* "Genera Plantarum secundum Ordines Naturales disposita."

† "A General System of Botany." 1873.

‡ "Introduction to the Natural Orders of Plants."

§ "Enumération des Genres des Plantes . . . . , suivent l'ordre établi dans l Ecole de Botanique."

2.

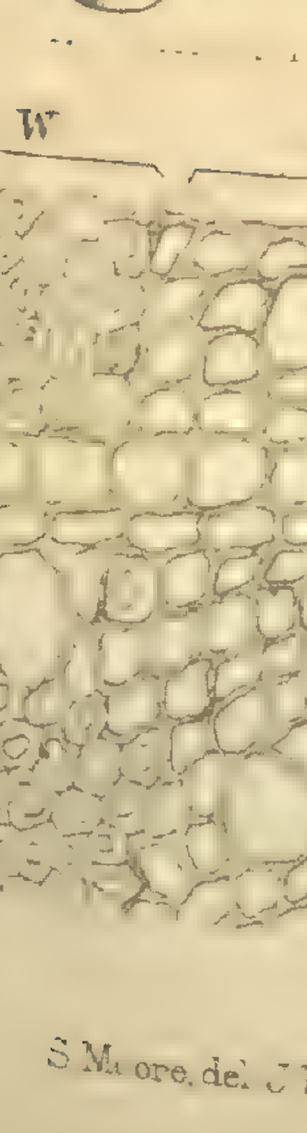
c.

a.

3.

b.

1.



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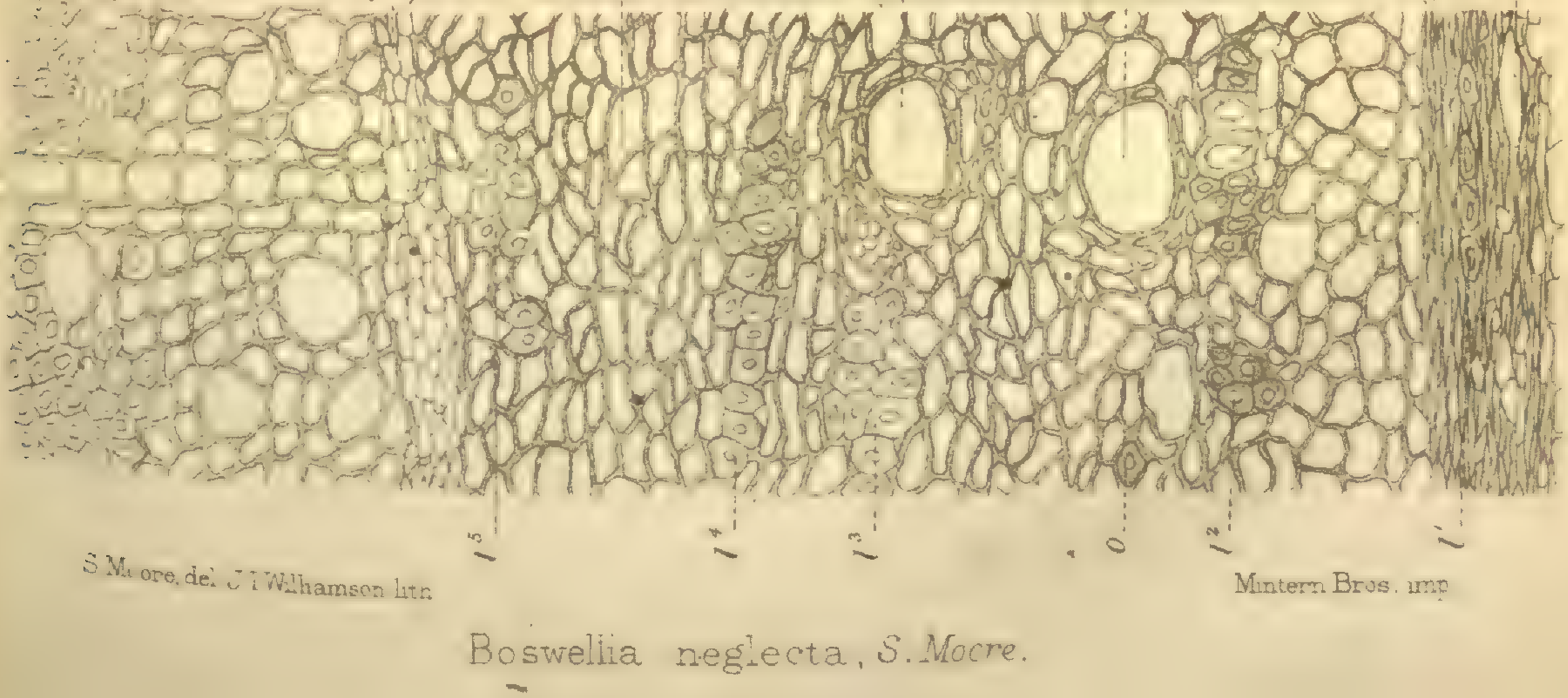

S Moore, del. J T Wilhamson lith.

Mintern Bros. imp.

Boswellia neglecta, *S. Moore.*

appears to agree with Brongniart's; but the *Orchideæ* are not included in the exalbuminous division, and the other division is split up into five groups, Spadicifloral, Glumaceous, Enantioblasteæ, Homoblasteæ, and Aschidoblasteæ, the last three of which are based on the character of the embryo.*

Only noticing those schemes which are important on account of their general adoption, or the authority of their propounders, we next come to that put forth by A. Braun in 1864, and adopted by Sachs, in which the whole are grouped in three series, Helobiæ, Micranthæ, and Corollifloral. The first series is divided by Sachs into three orders, Centrospermæ, Polycarpæ, and Hydrocharideæ, and the second series by Braun into the three, Spadicifloræ, Glumifloræ, and Enantioblastæ.†

Within the last few months Mr. Bentham has laid before the Linnean Society a division of Monocotyledons into four series, Epigynæ, Coronarieæ, Nudifloræ, and Glumales.‡

We propose now to compare these schemes, so as to glean from their agreement an eclectic system, which may suggest a hypothetical pedigree.

All the authorities do not quite agree with regard to Dr. Hooker's fifteen Monocotyledonous cohorts, but we may adopt the short name of the first, Hydrales, for the family *Hydrocharideæ*. All authorities agree to unite the orders *Cannaceæ*, *Zingiberaceæ*, and *Musaceæ*, for which the collective name *Scitamineæ* may be well retained. Though Braun separates the *Bromeliaceæ* from these orders, he leaves them near at hand, and we may perhaps, in spite of Mr. Bentham's query, group them together under the name Amomales. The alliance of *Orchidaceæ* and *Apostasiaceæ* is admitted, but we prefer Braun's name Gynandra to the less comprehensive Orchidales. Owing to differences of opinion, the *Burmanniaceæ* must be considered apart from the *Taccaceæ*. There seems to be but little doubt as to the Narcissales, though perhaps the *Vellosieæ* are nearer to the *Bromeliaceæ* than to the Narcissal *Hæmodoraceæ*; certainly the Dioscoreales must be placed very near this cohort. Whether worthy of being erected into a separate cohort or not, the *Triurideæ* must follow the fortunes of the *Alismaceæ*, which may be grouped *nem. con.* with the *Butomeæ*, *Juncagineæ*, *Potameæ*, and *Aponogeteæ* under Sachs' name *Polycarpæ*. Dr. Hooker terms *Naiadeæ* "obviously reduced *Alismaceæ*," but Sachs says "this family is not definable systematically, and should be split up into several," placing it himself among the *Centrospermæ*, so that, for the present, we must consider Dr. Hooker's cohort *Potamales* in two parts, *Polycarpæ* and *Naiadeæ*. *Palmæ*, *Phytelephasieæ*, and *Nipaceæ* are commonly considered as merely sub-orders, so that we may retain either the name *Palmaceæ* or *Palmales*. Braun groups them, as *Spadicifloræ*, with the *Aroideæ* and *Pandanaceæ*, which Dr. Hooker places in the next cohort (X., Arales), while Mr. Bentham separates the two last orders altogether from them. Sachs admits that *Lemnaceæ*, placed by Braun among the *Helobiæ*, and *Typhaceæ*, among the *Glumi-*

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* See Le Maout and Decaisne (ed. Hooker), p. 167.
† In Ascherson's "Flora of Brandenburg," and Sachs' "Lehrbuch."
‡ For an abstract of this see the last volume, p. 381.—[*Ed.*]

floræ, "should perhaps be rather included in" the same group with the *Aroideæ*, where they are placed by Adrien de Jussieu, Dr. Hooker, and Mr. Bentham. No authority disputes the relationship of the families grouped respectively by Dr. Hooker under the cohorts *Liliales*, *Pontederales*, *Commelynales*, *Restiales*, and *Glumales;* nor is it doubted that the first two of these five cohorts are closely related to one another, whilst we can trace a gradual passage from the *Glumales*, through the *Restiales*, which might well be termed *Semiglumales*, to the *Commelynales*, so that the two latter may well be united as *Enantioblastæ*, though this is premature on our part at this stage of the discussion, since it unites Mr. Bentham's *Coronarieæ* to his *Glumales*. An examination of the points of contact of the different authors thus reduces the theoretical entities which we have to consider to the following:—(1.) Hydrales, (2.) Amomales, (3.) Gynandræ, (4.) Burmanniaceæ, (5.) Taccaceæ, (6.) Narcissales with Dioscoreales, (7.) Polycarpæ with Triurales, (8.) Naiadeæ, (9.) Palmales, (10.) Arales, (11.) Liliales with Pontederales, (12.) Commelynales, (13) Restiales, and (14.) Glumales.

1. The exalbuminous character of Hydrales seems justly to outweigh their inferior ovary. The series recognised by Adrien de Jussieu from *Naias* to *Hydrocharis* seems to indicate affinity. Sachs admitting that *Lemnaceæ* may be removed from his order *Centrospermæ*, *Naiadeæ* will remain alone, with the *Polycarpæ* as close allies, so that we may adopt Dr. Hooker's description of them as "reduced *Alismaceæ*," and unite them under his cohort *Potamales*, with the *Polycarpæ*, the *Hydrales* remaining as a second and higher cohort of the series *Helobiæ*, reformed by the removal of *Lemnaceæ*.

4 and 5. *Taccaceæ* and *Burmanniaceæ* seem to have sprung from the great group Liliales, either through or in close proximity to *Smilaceæ*; they are therefore probably closely related, and may be united under the name Taccales. The undifferentiated embryo of *Burmanniaceæ* is probably only an adaptive modification, as in *Cuscuta*, their affinities being with Narcissales rather than Gynandra.

7 and 8. See 1 and 9. The spadicifloral character of the inflorescence and the similar habit of Palms and Arales are by no means sure guides to affinity. The *Palmæ* are most probably related, as suggested by Robert Brown, to the *Junceæ*, and through them to *Liliaceæ*.

12. Mr. Bentham places Commelynales between Pontederales and *Junceæ*, and their affinity to Restiales is so clear that it seems fatal to his separation of Glumales from Coronarieæ. With this explanation, it only remains to give our eclectic classification.

Series I. NUDIFLORÆ (Benth.).
  Division 1. *Helobiæ* (Braun).
    Cohort 1. Hydrales.
    Cohort 2. Potamales. (Orders. Butomeæ, Triuridæ, Alismaceæ, Naiadeæ, Juncagineæ, Potamogetoneæ.)
  Division 2. *Aro-pandaneæ*.*
    Cohort 3. Arales. (Orders. Aroideæ, Lemnaceæ, Pandaneæ, Typhaceæ.)

* The group-names with an asterisk appended are new ones.

Series II. Epigynæ (Juss.).
Cohort 4. Amomales.
,, 5. Gynandrales.*
,, 6. Taccales.
,, 7. Narcissales.
,, 8. Dioscoreales.
Series III. Chlamydanthæ.*
Division 1. *Coronarieæ.*
Cohort 9. Palmales.
,, 10. Liliales (including Pontederales).
Division 2. *Enantioblastæ* (Von Martius).
Cohort 11. Commelynales.
,, 12. Restiales.
Division 3. *Glumifloræ.*
Cohort 13. Glumales.

As Dr. Hooker has truly observed, it is impossible to construct a satisfactory linear arrangement of Monocotyledons, so that, if our knowledge was sufficient, a pedigree would indicate affinities far better.

NEW PALMS COLLECTED IN THE VALLEY OF THE AMAZON IN NORTH BRAZIL, IN 1874.

By James W. H. Trail, M.A., M.B., F.L.S.

(*Concluded from* p. 49.)

B. concinna, Mart., is easily recognised by the simple spadix. *B. riparia*, Mart., is distinguished from *B. Gaviona* and from *B. Curuena* by its larger size (trunk 3^m-$7^m \times \cdot 05^m$), very spiny trunk, leaves shorter (1^m-2^m), pinnæ projecting at various angles and more or less curled, rachis of spadix produced and bearing 20 or more branches, calyx of fl. ♀ annular, corolla much longer than it, no trace of sterile andrœceum, fruit depresso-globose, endocarp lenticular. Its habitat ("ygapo") is also different.

B. (*Augustinea*) *ovata*, Œrsted, differs from both *Gaviona* and *Curuena* in the less spiny petiole and vagina, in the smaller pinnæ (10-14 × ½ inch), in the more numerous branches of the spadix (11-12), and in the oval endocarp bluntly toothed at the apex.

It is very desirable that specimens of *B. ciliata*, *B. socialis*, *B. infesta*, *B. chætorachis*, *B. ovata*, *B. Gaviona*, and *B. Curuena* should be compared in order to determine whether they are all really distinct, or whether they are all forms of only one or two species. My knowledge of all except the last is derived only from the published descriptions and figures.

40. *B. turbinocarpa*, Barb. Rod. (l.c., p. 33, no. 19), (Trail hb. Palm., 12).—Caudicibus 2 vel pluribus ex eodem rhizomate ortis, $2 \cdot 4^m$-$3 \cdot 6^m \times \cdot 025^m$, aculeis nigris armatis; foliis 8 ^{m}-$\cdot 2^m$ ad vaginas

petiolos et costas tomento et pubescentia velutina ferruginea densissime vestitis, et aculeis (usque ad apicem costæ subtus) subnigris nitidis ·01ᵐ-·08ᵐ triangulari-subulatis 1-3-natim aggregatis valide armatis; (petiolo subtereti robusto supra subscisso, costa subtriangulari ad latera haud sulcata); pinnis concinnis, pectinatis, 20-21-jugis, alternis, lanceolatis, subfalcatis, ad apicem cuspidato-acuminatis, ad margines sparse setoso-ciliatis, ·45ᵐ-·50ᵐ × ·035ᵐ, textura rigidis, supra glabris, vena primaria unica et venis secundariis 6-8 prominentibus, et venulis transversis inter venas secundarias conspicuis, pinnis subtus velutinis, et præter margines virgis pubescentiæ ferrugineæ percursis; spatha exteriore membranaceo-coriacea, apice bifida antice velutina; spatha interiore ·45ᵐ, anguste fusiformi, aculeolis ·003ᵐ-·008ᵐ subnigris tandem expallidis semiadpressis ita obsessa ut pellem animalis hirsutam appareat; spadice ·35ᵐ-·4ᵐ, pedunculo compresso, decurvo, pube ferruginea velutino, ·25ᵐ-·32ᵐ, rachi ·01ᵐ ramos 6-8 pubescentes ·05ᵐ-·1ᵐ, bracteis triangularibus cuspidatis parvis suffultos, proferente; fl. ♂ ?; fl. ♀ ?; drupa ovata longe cuspidata ·03ᵐ × ·015ᵐ fusca, pubescentia fusca et setis subnigris obsessa; mesocarpio tenui, subsicco, endocarpio obovato, gibboso, duro, nigro, subtenui; drupæ calyce cupulari subglabro, ore multifido; corolla, quam calyx duplo longiore, cupulari, extus et intus supra medium tomento fusco vestita; androœceo sterili corollæ fundo stricte adnato, pertenui.

Hab.—In sylvis primævis ad Cataractas, fl. Trombetas.

Obs. 1.—I am fortunately able to identify this species with certainty, having been in the company of Dr. Rodriguez when he discovered it.

Obs. 2.—*B. turbinocarpa* approaches *B. trichospatha* in the pubescence (though shorter and more dense) on the costa of the leaves, in the form and armature (though coarser) of the spathe, and in the few branched spadix with velvety pubescence; in the form of the pinnæ it also reminds one a little of that species, but in other respects it is well characterised, and should hardly be mistaken for any other. The sterile andrœceum is so thin and so closely united to the interior of the corolla that it might be taken for merely the smooth inner surface of the latter, so that I had some difficulty in coming to a conclusion on the matter.

41. *B. syagroides* (Trail hb. Palm., 20, 46).—Humilis, aculeata; caudice ·6ᵐ-1ᵐ × ·008ᵐ inermi, obscure annulato, vaginis pereistentibus vestito; foliis 1ᵐ-1·4ᵐ pectinatis, concinnis; petiolo glabro ·5ᵐ-·9ᵐ (vagina ·1ᵐ-·2ᵐ inclusa, lepra badia vestita), compresso-tereti vel obtuse carinato, ad basin aculeis nigris ·004ᵐ-·005 subcompressis 2-3-natim aggregatis armato, costa supra acute bisulcata, faciebus floccis badiis adspersis; pinnis 30-35-jugis, oppositis vel alternis, ·25ᵐ-·35ᵐ × ·008ᵐ-·015ᵐ, lineari-lanceolatis, longe acuminatis, supra subtusque, concoloribus, supra glabris, ad venam primariam ultra medium, subtus ad venas, et ad margines setis nigris ciliatis; spatha exteriore coriacea, ·05ᵐ, inermi; spatha interiore (fragmentis solum visis) ·1ᵐ-·12ᵐ, subaculeata?; spadice ·1ᵐ, pedunculo ad angulum 90° deflexo, apicem versus aculeis compressis, nigris, ·002ᵐ-·004ᵐ, semipatulis, horrido, rachi producta ramos 7 subparallelos edente; fl. ♂ ?; fl. ♀ ?; drupa?

Hab.—Prope pagum Aveyros, fl. Tapajos, etiam ad fl. Abacaxis, in sylvis primævis nunquam inundatis.

Obs. 1.—Dr. Rodriguez (l.c., p. 33) has indicated (from specimens given to him by myself from Aveyros) the species under the name *B. cyagroides*. As I was the author of the name, having given him specimens under that as a provisional name in case it should prove to be undescribed, I have restored it to its proper form, viz., *syagroides*, as I gave the name from its resembance in habit to *Syagrus cocoides*, Mart, on a small scale. I have the less hesitation in doing so as Dr. Rodriguez's description is not sufficient as a means of identifying the species; I quote it here :—

"18. *B. cyagroides*, Barb. Rod. et Trail.—Stipite altitudine 1^m-$1{\cdot}5^m$, diametro 0·15 ; vaginis petiolorum persistentibus obvelatis, cum pubescentia spinis deciduis ; frondibus pinnatis; foliolis 30-33-jugis, 5-0 , 10 latis, linearibus, longe acuminatis; spatha breviter aculeata. (Barb. Rod. hb. Palm., 328.)"

Obs. 2.—This species should hardly be confounded with any but *B. concinna*, subsp. *depauperata*, Trail, from which it is distinguished by the more numerous pinnæ and by the branched spadix.

Obs. 3.—Owing to the absence of flowers and fruit, and to this species not showing close affinity to any described species, it is not certain at present to which section of the genus it may prove to belong.

Genus Astrocaryum, *Meyer.*

This genus is well represented in the Amazon Valley, usually by conspicuous forms which aid in giving a peculiar aspect to the forests and campos of that country. Some of the species, however, are stemless, while others do not exceed 20 feet in height of trunk, and aid in forming the dense thickets and undergrowth so frequently met with in Amazonia. All the species are very spiny, trunk, leaves, and spathes all bearing long black compressed spines. On the trunk the spines (usually reflexed) form rings of greater or less breadth. In all the leaves are pinnate. The pinnæ usually exceed 40 pairs in number ; they are almost always linear-lanceolate, with 1 primary and 6-8 secondary veins, more or less plicate, and whitish below.

Unfortunately I collected and made notes on few of them, partly on account of their large size rendering their collection difficult while travelling, partly from a belief that the large species of Amazon Palms had already been wrought out.

42. *A. Paramaca*, Mart. (Palmet. Orb., pp. 88-9).

? var. *Javarense* (Trail hb. Palm., 185.)—Acaule, vel caudice sub $\cdot6^m$, aculeato, vaginis obvelato ; foliis pluribus contemporaneis, $4{\cdot}5^m$-8^m, æqualiter pinnatis, ad petiolos ($1{\cdot}2^m$-$1{\cdot}8^m$) aculeis nigris, $\cdot02^m$-$\cdot12^m$, in greges $\cdot01^m$-$\cdot03^m$ dissitos, 90-100-natim aggregatis valide armatis; costa aculeis brevioribus sparsioribus armata; pinnis 100-110-jugis, lineari-lanceolatis, acuminatis, mediis $\cdot75^m$-$\cdot9^m \times \cdot04^m$, deorsum et sursum minoribus, ad margines et ad venam primariam supra aculeolis nigris ciliatis; spathis 2, interiore $\cdot9^m$, ventre fusiformi, sublignea, ad basin pilis colore carneis, ad medium setis fuscis dense vestita ita ut pellem animalis referat, apicem versus aculeis subnigris sed carnoso-floccosis contortis fragilibus $.01^m$-$\cdot05^m$ armata et penicillata ; spadice $\cdot9^m$, pedunculo carnoso-floccoso, inermi

vel armato, rachi ·2^{m}, ramos plurimos ·08^{m}-·1^{m} inermes, pedicellis ·025^{m}-·04^{m} ornatos proferente; fl. ♂ alveolatis, solitariis, hexandris, alveolis hexastichis; fl. ♀ solitariis, in basi ramulorum sessilibus; calyce et corolla subæqualibus, urceolaribus, ore tridenticulatis, extus aculeolis subnigris nitidis dense armatis; androeceo sterili quam corolla duplo breviore, eidem que arcte adhærente; drupis (immaturis ·02^{m}-·04^{m}) obovatis, ad basin pressione mutua polygonis, rostellatis, aculeis ·01^{m} nitidis, subnigris, contortis adpressis crebris armatis.

Hab.—In sylvis ad Camaná, fl. Javary. Ab Indis "Murumurú" nuncupatur.

Obs. 1.—From *A. Paramaca* the above palm differs chiefly in the slighter armature of the spadix, in the sessile ♀ flowers, in the absence of spines or setæ below the ♀ flower, in the corolla and the calyx being of equal length and thickly covered with spines, and in the fruit also being more spiny. I know *A. Paramaca* only from the description; hence it is possible that on comparing specimens of the two palms *A. Javarense* may prove to be a distinct species.

Obs. 2.—From *A. Murumurú*, Mart., it differs in being stemless or nearly so, in the longer leaves, in the more numerous pinnæ, in the 6 stichous alveoli of the male flowers, in the calyx being equal to the corolla and both being very spiny, and in the larger and far more numerous spines on the fruit.

From *A. Ayri*, Mart., it differs in being stemless or nearly so, in the longer leaves, in the inner spathe, in the unarmed or slightly armed spadix, the spines when present being adpressed, in the unarmed pedicels of the ramuli which are longer than in *A. Ayri*, in the unarmed bracts of the female flowers, in the hexastichous alveoli, in the calyx equalling the corolla, and lastly in the habitat.

It can hardly be mistaken for any other species than those mentioned.

43. A. MINUS, *sp.n.* (Trail hb. Palm., 213).— Mediocre; caudice solitario, 2·4^{m} × ·1^{m} (ad basin)-·07^{m} (ad apicem), nudo, valide annulato, inter annulos aculeis transverse subseriatis, ·01^{m}-·03^{m}, nigris armato; foliis compluribus contemporaneis, 5·5^{m}-6^{m}, æqualiter pinnatis, ad vaginas petiolos et costas aculeis nigris ·01^{m}- 08^{m} valide armatis; pinnis 60-70-jugis, suboppositis, lineari-lanceolatis, acuminatis, 1^{m} × ·03^{m}, sursum brevioribus, 5·7-venosis, valide plicatis, supra glabris, subtus albidis, ad margines setoso-ciliatis; spatha (unica?) sublignea fusco-setoso-pellita, et apicem versus aculeis ·01^{m}-·03^{m} fuscis armata; spadice 1·6^{m}, pedunculo 1·3^{m} ferrugineo-leproso et aculeis ·005^{m}-·01^{m} nigris adpressis sparsis armato, rachi ·3^{m} ramos plurimos ·09^{m} flexuosos pedicellis ·01^{m}-·02^{m} setosis ad basin in receptaculum subligneum dilatatis prædítos proferente; fl. ♂ ?; alveolis 5-stichis; fl. ♀ sessilibus in receptaculis; calyce et corolla subæquilongis, urceolaribus, ore tridenticulatis, a symmetricis, extus aculeis ·01^{m} contortis subnigris adpressis vestitis; androeceo sterili corolla ⅓ breviore, ovario ovoideo.

Hab.—In sylvis primævis ad Barreiras de Mutum, fl. Jutahi, ab indigenis "Murumuru-i" vocatur.

Obs.—This species has much the habit of *A. Tucumá*, Mart., in miniature, but it can hardly be confounded with any species save *A. gynacanthum*, Mart., or its variety *A. Munbaca*, Mart. (sp.). From

these it is readily distinguished by its larger size, much longer leaves with more numerous pinnæ, longer pinnæ, and longer spadix. Comparison of examples of the two species shows at once that they are distinct, though it is rather difficult to express the points of difference in a description.

44. Dr. Rodriguez (l.c., p. 20, no. 1) has described a species of *Astrocaryum* under the name *A. aculeatum*, Mart., quoting also as a synonym *A. aculeatum*, G. W. F. Meyer, Esseq., 266.

Meyer in his description (which is quoted by Martius) says, "pinnis linearibus præmorsis . . . drupa subglobosa inermi." This can certainly not refer to the same species as Dr. Rodriguez describes, as will be seen from his description quoted below. I brought a spadix with ripe fruit and pinnæ from near the lowest rapids on the Trombetas, and can corroborate the accuracy of the description. My specimens (Trail hb. Palm., 17) were identified by Dr. Rodriguez as *A. aculeatum*, Meyer.

"1. *Astrocaryum aculeatum*, Mart.—Stipite procero, solitario, aculeato. Frondibus curvo-patentibus; petiolo supra canaliculato et dorso convexo, ubi regulariter et transverse lineis aculeorum obliquorum ornatur; foliolis oblique acuminatis, linearibus; drupa oblonga pistillo persistente, aculeata, rubro-aurantiaca.

"*Hab.*—In montibus lacui José Açu proximis, in districto de Villa Bella, in Provincia Amazonum. Fructificat in Februario. (Barb. Rod. hb. Palm., 320.)

Stipes ut altus 16^m, diametro $0{\cdot}11^m$; internodia $0{\cdot}2^m$, aculeis referta; folia 25 contemporanea, 7^m longa; petiolus $\cdot 2^m$; rachis 5^m; foliola 90-100 utrinque, linearia, oblique acuminata, $1{\cdot}06^m$ longa, $0{\cdot}045^m$ lata; spadix ramosus $2{\cdot}5^m$, longus; rachi $0{\cdot}40^m$ longa."

As it is certainly not *A. aculeatum*, Meyer, and as I believe it to be distinct from all previously described species, I would propose for it the name of *A. Rodriguezii*, in honour of its discoverer. To his description I have to add that the stem varies much in height, and is sometimes wanting, and that the fruits are closely packed on the simple rachis, the female flowers being sessile, each situated at the base of a ramulus, and that the calyx and corolla of the ♀ fl. are setose.

A. acanthopodium, Barb. Rod. (l.c., p. 21, no. 2), seems to me, so far as one can judge by the brief description, to be the stemless variety of the species just discussed, but I do not venture to unite them, in absence of sufficient information.

Cocoinæ inermes.

45. *Cocos Inajai*, Spruce (Trail hb. Palm., 113).
= *Maximiliana Inajai*, Spruce (Palmæ Amazonicæ, p. 163); (S. hb. Palm., 9).
= *Cocos æquatorialis*, Barb. Rod. (l.c., p. 31).

Caudice $2{\cdot}5^m$-$6^m \times {\cdot}08^m$-$\cdot 1^m$, ligno molli, albo; foliis pluribus contemporaneis, suberectis vel patulis, subcrispis, $2{\cdot}5^m$-3^m, irregulariter pinnatis; pinnis 74-84-jugis, 2-6-natim aggregatis ut in *Maximiliana regia*, lineari-lanceolatis abrupte et inæqualiter cuspidato-acuminatis, $\cdot 45^m$-$\cdot 65^m \times {\cdot}025^m$-$\cdot 03^m$, sursum minoribus, venis secondariis 6-8;

spathis 2, exteriore ·38^{m}-·45^{m} pubescente, coriacea, bialata; spatha interiore ·6 -1·2^{m}, lignosa, crassa, extus profunde pluri-sulcata, primum anguste fusiformi-acuminata, dein cymbiformi, mucronata, post spadicis lapsum diu persistente; spadicibus ·55^{m}-1·1^{m}, in eadem stirpe aliis androgynis aliis masculis, ramos 24-30, tenues ·2^{m}-·4 edentibus; spadice ♂ ♀ ad rami cujusque tertiam partem basalem floribus 2 ad latera floris ♀, sursum binis ♂, vel ♂ solitariis; fl. ♂, sepalis valvatis, parvis, triangularibus, albis, petalis 3, valvatis, ovato-lanceolatis, acutis, planis, carnosis, albis; staminibus 6 inclusis, filamentis ad basin connatis, roseis; pistilli rudimento nullo; fl. ♀ albo-viridibus; sepalis, et petalis quam sepala brevioribus, ovato-triangularibus, ad basin auriculatis, coriaceis, convoluto-imbricatis; andrœcei sterili vestigio nullo; pistillo ovato, stigmatibus tribus apiculato; (drupas siccas solum vidi) drupa ovali, utrinque acuminato ·028^{m} × ·022^{m}, mesocarpio in fibras dissoluto, endocarpio durissimo, solido nec fibris percurso, umbrino, extus sublævi, lævissime trivalleculato, subtriangulari, uniloculari, basin versus foraminibus 3 (2 lamina tenui clausis) perforato, nucleo triangulari ·015^{m} × ·012^{m}, albumine albo, osseo, embryone subbasilari.

Hab.—In campis siccis prope urbem Manaos sat abundat (etiam ad fl. Jutahi? ubi "curua rana" vocatur).

Obs. 1.—The dimensions of the leaf given above are taken from mature plants bearing spadices; near Manaos I have frequently observed young plants in which the stem had not yet appeared above ground, the leaves of which were upwards of 6^{m} long, bearing from 140 to 150 pairs of pinnæ. I have observed in other species of Palms that short-stemmed or stemless varieties bore very long leaves.

Obs. 2.—I have removed this species from the genus *Maximiliana*, to which Spruce referred it, into *Cocos*, induced by the structure of the ♂ flower. However, *Maximiliana* seems to me to be rather a section of the genus *Cocos* than a well-characterised genus itself.

Obs. 3.—Dr. Rodriguez (l.c.) has given the name of *Cocos æquatorialis* to this species. I quote his reasons, which seem to me to need no comment.

"Jam hanc speciem descripseram quum Dr. Trail *Enumerationem Palmarum Sprucii* ostendit, in qua describitur species quædam *Maximiliana Inaja-y*. Postquam brevissimam legi descriptionem, mihi persuasum est eandem esse speciem, de qua locutus sum, sed præterquam quod ad genus *Cocos* pertinet, etiam nomine vulgari Inajá-y caret, quod ut indagavi in provincia ignotum est."

I shall also quote Dr. Rodriguez's description of this species.

"1. *Cocos æquatorialis.*—Stipite 8^{m} alto, inermi, semiflexuoso; frondibus erectis, inferioribus patentibus curvis, inæqualiter pinnatis; foliolis linearibus, acuminatis, recurvis, 3-4-nativis, alternis et ad cacumen oppositis. Drupa oblonga, vitellina."

Genus Elæis, Jacq.

Subgenus *Barcella*, Trail.—Flores monœcei in eodem spadice, ♂ supra ♀ in ramis dispositi; embryo medio-lateralis. Acaulis; foliis æqualiter pinnatis, pinnis pendulis, petiolis inermibus; floribus ♂ in alveolis profundis 2-natim dispositis, confertis, ♀ sparsioribus; spadice longe pedunculato.

46. Elæis (*Barcella*) odora (Trail hb. Palm., 76.)—Acaulis; foliis æqualiter pinnatis, petiolis inermibus, pinnis pendulis 38-40-jugis, lineari-lanceolatis (.75^{m}-·8^{m} × ·035^{m}-·045^{m}), siccis nigricantibus; spadice longe-pedunculato; fl. ♂ odoratissimis; drupis aurantiacis, glabris, ovatis, stigmatibus 3 persistentibus subrevolutis apiculatis; embryone medio-laterali; foliis pluribus contemporaneis 1·5^{m}-2·4^{m} arcuato erectis, æqualiter pinnatis, petiolis brevibus, pinnis 38-40-jugis, lineari-lanceolatis ·75^{m}-·8^{m} × ·035-·045^{m} (apicalibus ·22^{m} × ·006^{m}), vena media prominente et venis secondariis 6-8 percursis, siccis plicatis et nigricantibus; spathis 2; exteriore ·15, membranaceo-coriacea, acuta; interiore lignosa, fusiformi-acuminata, quam spadix maturus breviore; spadicibus inter folia ortis ·9^{m}, pedunculo ·6^{m}-·75^{m}, compresso-tereti, subarcuato, rachi ·15^{m}-·2^{m} ramos circa 40 sub ·12^{m} proferente; fl. ♂ binatim in alveolis rami partis superioris immersis, triangularibus, æstivatione valvatis; sepalis 3 concavo-carinatis ovatis, petalis 3 ovato-lanceolatis planis, staminibus 6, erectis, inclusis, filamentis in urceolum apice 6-fidum connatis, antheris oblongis, adnatis, ovarii rudimento parvo, stigmatibus 3 apiculato; fl. ♀ 6-9 ad basin ramorum 6-8 inferiorum solitariis, bracteis 3 cordato-triangularibus suffultis, æstivatione convoluto-imbricatis, sepalis 3 et petalis 3 cordato-triangularibus, coriaceis, andrœceo sterili quam corolla 4-plo breviore, libero, 6-fido, ore nigro-marginato, ovario ovato, 3-loculari, stylo brevi stigmatibus 3 magnis, revoluto patentibus, apiculato; drupis aurantiacis, glabris, ovatis, pressione mutua ad basin subpolygonis, stigmatibus 3 magnis persistentibus apiculatis, ·035^{m}-·045^{m} × ·03^{m}-·038^{m}; mesocarpio ·006^{m}, oleoso, aurantiaco, subdulci; endocarpio nigro, lapideo fibris paucis percurso, trigono, lateraliter triporoso, nucleo triangulari-elliptico, testa venis variegata, albumine cartilagineo, medio cavo, albo; embryone in eminentia laterali nuclei sito.

Hab.—In campis ad fl. Padauiri brachii fl. Negro ripas gregarie crescit; "Piassaba brava" ab indigenis vocatur.

Obs.—The male flowers have a very powerful sweet but somewhat sickly smell, which seems to render them very attractive to bees and other insects.

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. Holmes, F.L.S

(*Continued from p.* 56.)

Trichostomum rubellum, *Müll.* *Didymodon rubellus*, Br. & Sch. (Wils.; Berk.; Hobk.); *Weissia curvirostra*, Hook. & Tayl. (Jenner Tunbr.).

On chalky banks, shady walls, &c.; frequent. October, March Bry. Eur. ii., t. 185.

Morant's Court Hill!; *Jenner Tunbr.* Near Otford.

T. luridum, *Hornsch.* *Didymodon luridus* (Wils.; Berk.; Hobk.).

On chalky banks and old walls; frequent. Not observed in fructification. December. Bry. Eur. ii., t. 186.

Kent; *Mitten, Bry. Brit.*, p. 107. Hothfield; Sevenoaks; Otford, on chalk; Boughton Monchelsea, on limestone walls.

This species in the barren state much resembles the var. γ *brevifolia* of *Tortula fallax*, but may be distinguished by its more closely appressed, shorter, and more triangular leaves.

T. TOPHACEUM, *Brid.*

In damp places at foot of walls, and ledges in damp stone quarries, and wet sandy places. Widely distributed, but apparently not common. November, March. Bry. Eur. ii., t. 175.

Rochester; *Howse!* In fruit abundantly at foot of a wall in a lane near Rusthall Common, Romney Marsh.

T. FLAVOVIRENS, *Bruch.*

In sandy places and on grassy ledges near the sea; probably common. Not yet found in fruit in Britain. Spring. Journ. Bot., 1868, tab. 77; Bry. Eur. ii., t. 172.

Cliffs east of Dover; *Howse!* Between Sandwich and Deal; Romney Marsh.

In a young state the leaves have remarkably inflexed margins and obtuse apices. This species is easily known from *T. crispulum* and *mutabile* by the hyaline cells running from the base of the leaf some distance up the margins. [*T. mutabile*, Bruch., and *T. crispulum*, Bruch., should be looked for on chalky downs near the sea, and *T. littorale*, Mitt., on the banks of creeks.]

TORTULA ALOIDES, *Br. & Sch.* *Tortula rigida*, Hook. & Tayl. (Jenner Tunbr.).

On clay banks, damp earth, and mud walls. November, January. Bry. Eur. ii., t. 139.

On the bank by the roadside at Southfield Park; between Southborough and Tunbridge, &c., not common; *Jenner Tunbr.* Greenhithe; *George!* Folkestone; Boughton Monchelsea; Otford; Maidstone.

T. AMBIGUA, *Br. & Sch.*

On chalky banks and on damp rubble in chalk quarries, and on calcareous mud walls. December, January. Bry. Eur. ii., t. 139.

Greenhithe, in the large chalk pit; Dunton Green, near the station.

This species may be known from *T. aloides*, with which it has often been confounded, by its erect, not inclined capsule, and its much shorter leaves.

T. RIGIDA, *Schultz.* *Tortula stellata*, Schreb. (Hobk.).

On dry chalky hills, and on tops of calcareous stone walls. Rather rare. November, January. Bry. Eur. ii., t. 137.

Boxley Hill, Maidstone; in isolated tufts.

The *T. rigida* of Jenner Tunbr. I have referred to *T. aloides*, to which the figure quoted in that work belongs. So far as I have had the opportunity of observing, this species is most luxuriant on calcareous soil which contains magnesia. It is easily distinguished from the two other species by its elliptical, not oblong capsule.

[*T. lamellata*, Lindb. (*Pottia cavifolia*, δ. *gracilis*, Wils.), should be looked for on wall tops in chalky districts, and *T. atrovirens*,

Lindb. (*Desmatodon nervosus*, Br. & Sch.), on damp sandy or clayey ledges on cliffs near the sea. In December.]

T. CUNEIFOLIA, *Dicks.*

On sandy and clayey banks in lanes near the sea. February. Bry. Eur. ii., t. 156.

On an old wall N.E. side of Dover Castle; *Dillwyn*, 1805 (E. B. 1510).

This species appears to prefer loose soil in shady places under hedges. I have never observed it more than a few miles from the sea, and feel doubtful if the sentence in Forster Tunbr., p. 127, "On sandy banks and elsewhere," can apply to this species. Jenner does not appear to have found it near Tunbridge.

[*T. Vahliana*, Schultz, an inland species, is more likely to have been found in the neighbourhood of Tunbridge Wells, and should be looked for on moist banks on a sandy or clayey soil in February.]

T. MURALIS, *Turn.*

Walls and banks. Common everywhere. March, April. Bry. Eur. ii., t. 159.

Rocks on Tunbridge Wells Common; *Jenner Tunbr.* Dunton Green; Hythe.

Var. δ. *rupestris*. On conglomerate boulders by the roadside between Otford and Shoreham.

[*T. canescens*, Bruch., hitherto only found near Hastings, might possibly occur near Sandgate, and should be looked for on cliffs near the sea in March and April. It is easily distinguished from *T. muralis* by the tubular base of the peristome.]

T. MARGINATA, *Br. & Sch.*

On shady damp brick walls, sandstone rocks, and sandy banks. Frequent. Often growing intermixed with *T. muralis*. May, June. Bry. Eur. ii., t. 158.

Churchyard wall, Chiddingstone, near Penshurst; on walls, mixed with *T. muralis*, High Elms, Chelsfield; Penshurst Park, on the haha wall; in the grounds at Redleaf, on sandstone rockwork; Ightham, on a sandy bank, abundantly, with *T. muralis* growing separately within a few feet of it.

This species may be recognised at sight by its brighter green foliage and bright orange fruitstalks; also by the thickened margin and short hair-points of the leaves.

T. UNGUICULATA, *Hedw.* *Tortula mucronulata*, Hook. & Tayl. (Forster Tunbr.).

Walls, and banks, and fields. Common everywhere. Winter. Bry. Eur. ii., t. 142, 143.

Dunton Green; *George!* Abbey Wood; Folkestone; Romney Marsh; Maidstone; Dover; Hythe; Halstead.

Var. γ. *apiculata*, Wils. Hedw. Sp. Musc., t. 26.

Chalky banks near Otford, in fructification.

A small compact form of this species grows on the top of the cliffs near Folkestone.

T. BREBISSONI, *Brid.* *Tortula mucronata*, Brid. (Hobk.); *Cinclodotus riparius*, β. *terrestris*, Br. & Sch. (Wils.; Berk.).

On roots of trees by sluggish streams. Frequent. The fructification rather rare. April, May. Bry. Eur. Suppl. iii., iv.

Posts, &c., within reach of floods at Tunbridge; *Jenner Tunbr. Suppl.* Penshurst Park, abundant; on a tree near Ashover Wood, in fructification.

This species generally grows in company with the next species and *Orthotrichum Sprucei*. It may be distinguished from the former by having the leaves distinctly margined and mucronate, not obovate and emarginate.

T. LATIFOLIA, *Br. & Sch.*

On roots of trees and posts, near streams. April, May. The fructification very rare. Bry. Eur. ii., t. 164.

"One plant in fruit, on an old bridge between Tunbridge and the Powder Mills, May, 1844;" *Jenner Tunbr.* Penshurst Chislehurst, on the root of a tree by the roadside near a pond; on the root of a large tree at the top of the hill near Otford Station (the large spreading root of this tree forms cavities in which the rain collects).

T. SUBULATA, *Brid.*

On sandy hedgebanks in hilly districts. Frequent. Bry. Eur. ii., t. 160.

Greenhithe; *George!* Abbey Wood; Hayes Common; Ide Hill, near Sevenoaks; Halstead; Ightham; Hythe.

T. RURALIS, *Hedw.*

Thatched roofs, sandy shores, walls, trees, &c. Very common Bry. Eur. ii., t. 166. The fructification rather rare.

Dunton Green; *George!* Sandhills near Sandwich; Lydd; New Romney.

This species when growing on trees may be distinguished from *T. lævipila* by its leaves tapering slightly towards the apex, which is slightly hyaline and serrate, and by the rough hair-points.

T. INTERMEDIA, *Brid. Tortula ruralis, β. minor*, Wils. (Wils.).

On chalky or limestone banks and walls. Winter and early spring.

Boughton Monchelsea.

In this species the leaves are more erect and obtuse than in the last, and the hair-points very long and rough.

T. LÆVIPILA, *Brid. Tortula ruralis, β. lævipila*, Hook. & Grev. (Jenner Tunbr.).

Trunks of trees. Frequent. Generally in fructification. Summer. Bry. Eur. ii., t. 164.

Trunks of trees at Southborough, Tunbridge, &c.; *Jenner Tunbr.* Wye; Lympne; Dover; Hythe.

T. PAPILLOSA, *Wils.*

On trees in damp localities, near ponds, or in marshes. The fructification not known. Bry. Brit., t. xliv.

Hedge near Postling; Hothfield Park, on trees near the pond; trees below Lympne, abundant.

This species may be recognised at sight from *T. lævipila*, with which it grows intermixed, by the involute margins of the leaves, and the gemmæ in the centre of the concave leaf.

T. SINUOSA, *Wils. MSS.* *Trichostomum sinuosum*, Lindb.; *Dicranella sinuosa*, Wils.

On stones, roots of trees, in chalky or limestone districts. Frequent. The fruit not known. Journ. Bot., 1871, t. 120, f. 6.

Dunton Green; Sevenoaks; Westerham; Brastead; Otford; Hythe.

T. SQUARROSA, *De Not.*

In sandy grassy places near the sea, especially where the sand is slightly calcareous. The fruit not seen. May, June. Bry. Eur. ii., t. 152.

Deal!; *Mitten;* Near Sandwich, abundantly; sandy ground, near New Romney.

CERATODON PURPUREUS, *Brid.* *Didymodon purpureus*, Hook. & Tayl. (Jenner Tunbr.).

On banks, heaths, meadows, &c. Very common. Spring. Bry. Eur. ii., t. 189, 190.

Forest Hill; Dover; Chislehurst; Bexley; &c.

The barren plant, which was noticed at Chislehurst and Bexley, has a lighter colour and narrower leaves, and occurs in denser tufts than the fertile plant.

(*To be continued.*)

SHORT NOTES.

CAREX ERICETORUM (see p. 57).—The specimens of this plant in my collections were not gathered by myself at Mildenhall, Suffolk, but were given to me by a botanical friend.—W. C. TREVELYAN.——The plant on the Gogmagog Hills is indeed "struggling under difficulties," for it is as much as it can keep alive, being periodically cut off by people who pare the turf to lay it down in gardens at Cambridge. I have often thought that the plant was lost, but it has appeared again in a year or two. There seems no reason to doubt that Sir W. C. Trevelyan's specimens were gathered on the heath near Mildenhall, in Suffolk. The locality is a very probable one. I may add, what I thought I had already sent for publication, that Mr. H. L. Jones, of Caius College, has found (July, 1876) a very good locality for *C. ericetorum* on Newmarket Heath, on the right hand of the road from Cambridge, just before the Devil's Ditch is arrived at. He got very few specimens, and was unable to go again last season, but told me that the plant appeared to be abundant, intermixed with *C. præcox*, as in the original station. Surely it may be found on other chalky ground if well looked for.—C. C. BABINGTON.

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BUD-FERTILIZATION IN ORCHIDS (see p. 57).—It is not now for the first time that *Vandeæ* are known to be implicated in this phenomenon. In 1853 I watched frequently the same thing in a small-flowered variety of *Maxillaria rufescens*, Lindl., which I then named (in Mr. Keferstein's garden at Kröllwitz, near Halle) var. *cryptogama*. I possess a sketch of the plant made at the time; the specimens were sent from Venezuela by Hermann Wagener. This case I have already

published in "Bonplandia," ii., 1854, p. 16, and in this Journal, 1865, p. 2. In the latter place *Dendrobium cretaceum*, Lindl., and *Neotinea intacta*, Rchb.f., are quoted as other examples, and I ventured to remark that as early as 1851 I suspected this cleistogamy (see Orchidogr. Europ., p. 3).—H. G. Reichenbach, fil.

Reproduction of the Ascomycetes.—It can scarcely be correct to say, as is said in the Journal of last month (p. 62), "The brilliant work of Van Tieghem and Brefeld has demolished the pollinodium and ascogonium theory, and the last corner in which sexuality of the higher Fungi was supposed to lurk has now been swept clear by Cornu." Cornu's memoir is dated July, 1876, and since then Dr. Stahl has been at work in one particular "corner," at least, which the former is supposed to have "swept clear." I will quote his results in his own words ("Botanische Zeitung," November 3rd, 1876, 691): "As the results which I have obtained from my investigations on the subject of the reproduction of the Lichens prove their sexuality most conclusively, Van Tieghem's and Brefeld's objections to the sexuality of the Ascomycetes, to which the Lichens undoubtedly belong, cannot, though they claim universal validity, be made to harmonise with my results." Two other important declarations relating to the question at issue have been made by Dr. Hermann Bauke in his "Beiträge zur Kenntniss der Pycniden" ("Nova Acta," Dresden, 1876) already noticed in this Journal, p. 21: "It is well known that Stahl by his researches (previous to those mentioned above) on the nature of Lichens has proved the accuracy of Tulasne's theory concerning the great group of the Ascomycetes; the similarity of the process of fructification in this group to that of the *Florideæ*, which has been long known, allows of no doubt about the meaning of the spermogonia of Lichens. *It must besides be kept in view, that, apart from the Lichens, the life-history of exactly those Ascomycetes in which the spermogonia constantly accompany the perithecia, is completely unknown, and that the mere capability of germination of the spermatia affords no satisfactory proof against the supposition that they are the reproducing organs.*" There are yet other authorities who share the views of Drs. Stahl and Bauke.—George Murray.

Poisonous Plant.—Some Italian sailors, belonging to a vessel lying in Falmouth Harbour, were poisoned recently by eating herbs which grow on the shore near St. Just. One of the men who was most affected was taken to the Sailors' Home Hospital, where he died after suffering great agony. The poisonous plant resembles Watercress, and is mistaken for it by strangers. A few years since two Italians died immediately after partaking of it.—This is from the "British Medical Journal." What is the plant?

Notices of Books.

The Effects of Cross- and Self-Fertilisation in the Vegetable Kingdom. By Charles Darwin, M.A., F.R.S. London: John Murray. 1876.

It has for some time been known, and had long previously been suspected, that great benefit is derived from the cross-fertilisation of plants. Indeed, to have a feeling approaching certainty on this subject, it is sufficient to observe Dichogamy—the disagreement in point of time between the bursting of the anthers and the ripening of the stigma—or to examine superficially a few irregular flowers, of which the structure is such as entirely to prevent self-fertilisation. Hitherto, however, we have not known to what precise extent the benefit derived from crossing reaches, neither is there any record of experiments which, lasting through several generations, can yield a clear notion of the cumulative evils of continued interbreeding. In this remarkable volume, a result of the labours of eleven years, Mr. Darwin has brought together a vast array of facts bearing on the subject of fertilisation, flanked by observations and interpretations, which are handled with the masterly grasp, both of details and of generals, which is so peculiar a mark of all his work.

As might be expected, no exception worth mention can be taken to Mr. Darwin's method, which was as follows. Each plant experimented on was placed under a net stretched on a frame large enough to cover the plant without touching it. Several flowers were then marked and fertilised with their own pollen, and an equal number, marked in a different way, were crossed with pollen from a distinct plant. In order to have the experiments as like as possible to nature, the crossed flowers were never castrated. "In some few cases of spontaneously self-fertile species, the flowers were allowed to fertilise themselves under a net, and in still fewer cases uncovered plants were allowed to be freely crossed by the insects which incessantly visited them." Care was taken not to gather the seeds before they were ripe, and they were afterwards usually placed in damp sand on opposite sides of a glass tumbler covered by a glass plate, with a partition between the two lots, and the apparatus was kept in a warm room. If any seeds germinated on one side before any on the other, they were thrown away; but as often as a pair germinated simultaneously, they were planted on opposite sides of a pot, and this was done until from half-a-dozen to a score or more pots were brought into requisition. If one of the young seedlings fell sickly or was injured, it was pulled up and thrown away, as well as its companion on the other side of the pot. The seeds which remained after the requisite number of seedlings had been placed in pots, were sown crowded on opposite sides of larger pots, or sometimes out of doors. The soil was well mixed, and the plants on both sides of the partitions were watered at the same time, and as equally as possible. Usually the height of each plant was carefully measured, and often more than once; sometimes also, each was cut down close to the ground after the height-measuring, and an equal number of crossed and self-fertilised were weighed. In the cases of

crowded sowings, where there was a great struggle for existence, only the tallest of the full-grown survivors were measured. This method was pursued during the whole series of experimental generations.

The chief real or supposed sources of error alluded to are: the presumed detriment to the health and fertility of plants covered by a net while in flower; if this objection is valid, which Mr. Darwin doubts, the legitimacy of the results is not interfered with, since both the crossed and self-fertilised plants were covered by a net: the liability of some of the self-fertilised plants to become crossed by means of *Thrips* and other small insects which it is impossible to exclude; but this cross would almost always be with plants on the same stem, and such crossing Mr. Darwin finds to be either not at all or only slightly beneficial: thirdly, as the crossed flowers were never castrated, it is possible that the cross-fertilisation was ineffectual in some instances, and that afterwards the plants were self-fertilised; now it must be observed that if this ever occurred, it would only cause the effects of cross-fertilisation to be underrated, and the same remark would apply to the second source of error.

It will be convenient to take *Ipomæa purpurea* as a type, and to exhibit the main results obtained from this species in two tables.

Ipomæa purpurea. *Summary of Measurements (in Inches) of the ten Generations.*

Number of the generations.	Number of crossed plants.	Average height of crossed plants.	Number of self-fertilised plants.	Average height of self-fertilised plants.	Ratio between average heights of cross and self-fertilised plants.
First generation	6	86·00	6	65 66	as 100 to 76
Second generation	6	84·16	6	66·33	as 100 to 79
Third generation	6	77·41	6	52·83	as 100 to 68
Fourth generation	7	69·78	7	60·14	as 100 to 86
Fifth generation	6	82·54	6	62·33	as 100 to 75
Sixth generation	6	87·50	6	63·16	as 100 to 72
Seventh generatn.	9	83·94	9	68·25	as 100 to 81
Eighth generation	8	113·25	8	96·65	as 100 to 85
Ninth generation	14	81·39	14	64·07	as 100 to 79
Tenth generation	5	93·70	5	50·40	as 100 to 54
All the ten generations taken together.	73	85·84	73	66·02	as 100 to 77

The second table deals with the respective productiveness of the crossed and self-fertilised plants of the successive generations; the fertility of the crossed plants is taken as 100.

First Generation of crossed and self-fertilised Plants growing in competition with one another.—Sixty-five capsules produced from flowers on five crossed plants fertilised by pollen from a distinct plant, and fifty-five capsules produced from flowers on five self-fertilised plants fertilised by their own pollen, contained seeds in the proportion of . . . . . 100 to 93

Fifty-six spontaneously self-fertilised capsules on the above five crossed plants, and twenty-five spontaneously self-fertilised capsules on the above five self-fertilised plants, yielded seeds in the proportion of . . . 100 to 99

Combining the total number of capsules produced by these plants, and the average number of seeds in each, the above crossed and self-fertilised plants yielded seeds in the proportion of . . . . . 100 to 64

Other plants of this first generation grown under unfavourable conditions, and spontaneously self-fertilised, yielded seeds in the proportion of . . . . . 100 to 45

Third Generation of crossed and self-fertilised Plants.—Crossed capsules, compared with self-fertilised capsules, contained seeds in the ratio of . . . . 100 to 94

An equal number of crossed and self-fertilised plants, both spontaneously self-fertilised, produced capsules in the ratio of . . . . . 100 to 38

And these capsules contained seeds in the ratio of . 100 to 94

Combining these data, the productiveness of the crossed to the self-fertilised plants, both spontaneously self-fertilised, was as . . . . . 100 to 35

Fourth Generation of crossed and self-fertilised Plants.—Capsules from flowers on the crossed plants fertilised by pollen from another plant, and capsules from flowers on the self-fertilised plants fertilised with their own pollen, contained seeds in the proportion of . . 104 to 94

Fifth Generation of crossed and self-fertilised Plants.—The crossed plants produced spontaneously a vast number more pods (not actually counted) than the self-fertilised, and these contained seeds in the proportion of . . . . . 100 to 89

Ninth Generation of crossed and self-fertilised Plants.—Fourteen crossed plants spontaneously self-fertilised, and fourteen self-fertilised plants spontaneonsly self-fertilised, yielded capsules (the average number of seeds per capsule not having been ascertained) in the proportion of . . . . . 100 to 26

Plants derived from a cross with a fresh stock compared with intercrossed Plants.—The offspring of intercrossed plants of the ninth generation, crossed by a fresh stock, compared with plants of the same stock intercrossed during

ten generations, both sets of plants left uncovered and naturally fertilised, produced capsules by weight as . . . . . 100 to 51

The following summary exhibits in a very condensed form the additional advantages gained by crossed seedlings over self-fertilised ones. The former usually rise higher, and so rob the others of nourishment and sunlight. The cross-fertilised, if sown in soil in which other plants have long been growing, invariably show greater vigour than do their self-fertilised competitors. Again, if the seedlings are sown very thickly, the crossed are almost always much superior to the others. The former also are more capable of resisting the effects of cold and of change in external conditions. Independently of any external cause, too, the self-fertilised are the more liable to premature death. Moreover, as the number of self-fertilised generations increases, there is often observed a coincident tendency to a decrease in the size of the anthers and in the production of pollen, and the flowers, besides becoming uniformly coloured, sometimes show signs of monstrosity, and they will fall off after fertilisation, in the manner of hybrids. Finally, the crossed usually flower before the self-fertilised; this occurred in 44 cases out of 58, and was shown very strikingly by a cross-flowered *Cyclamen* flowering *some weeks* before its self-fertilised opponent.

The consideration of the relations between insects and the dusting of flowers is, of course, treated in detail. With regard to the exclusion of insects, Mr. Darwin found that out of 125 species, 65 were either quite sterile under these circumstances, or produced less than half the usual number of seeds; while in the other 60 fertility was perfect, or else not impaired to the extent of a half. The cause of bees constantly visiting flowers of the same species, and so favouring crossing, is attributed to the fact that they have just learnt exactly how to place themselves in order to get at the nectar; they are therefore enabled to work more quickly by remaining constant to one species.

Mr. Darwin thinks that the assumption of hermaphroditism, due to a process of budding, may perhaps be explained by the risk which diœcious plants ran of not being fertilised. The relations between monœcism, diœcism and hermaphroditism are discussed in a most interesting manner. Thus it is shown that diœcious plants have a great advantage over other plants in their cross-fertilisation being assured, counterbalanced though by the necessity to produce a vast superfluity of pollen, and by the risk of fertilisation sometimes failing. Moreover, half the flowers evidently cannot bear seed, and as Delpino has remarked, diœcious plants cannot spread as easily as others, because a single individual arriving at a new habitat would not be able to propagate. Monœcious species would often be diœcious in function (*e.g.*, by Dichogamy), and they would possess the advantage of sometimes producing self-fertilised seeds. Hermaphrodite plants are generally capable of producing some self-fertilised seeds, while they are also capable of cross-fertilisation usually either by the aid of insects or of the wind; when, however, the structure of the flowers is such as to preclude self-fertilisation, they are in the same position one to another

as are monœcious and diœcious species, with the additional advantage that every flower is able to produce seed.

The following extract contains a brilliant elucidation of the *raison d'être* of the existence of large dichlamydeous trees with an abundance of bisexual flowers. "The case of a great tree covered with innumerable hermaphrodite flowers seems at first sight strongly opposed to the belief in the frequency of intercrosses between distinct individuals. The flowers which grow on the opposite sides of such a tree will have been exposed to somewhat different conditions, and a cross between them may perhaps be in some degree beneficial; but it is not probable that it would be nearly so beneficial as a cross between flowers on distinct trees, as we may infer from the inefficiency of pollen taken from plants which have been propagated from the same stock, though growing on separate roots. The number of bees which frequent certain kinds of trees when in full flower is very great, and they may be seen flying from tree to tree more frequently than might have been expected. Nevertheless, if we consider how numerous are the flowers, for instance, on a horse-chestnut or lime-tree, an incomparably larger number of flowers must be fertilised by pollen brought from other flowers on the same tree, than from flowers on a distinct tree. But we should bear in mind that with the horse-chestnut, for instance, only one or two of the several flowers on the same peduncle produce a seed; and that this seed is the product of only one out of several ovules within the same ovarium. Now we know, from the experiments of Herbert and others, that if one flower is fertilised with pollen which is more efficient than that applied to the other flowers on the same peduncle, the latter often drop off; and it is probable that this would occur with many of the self-fertilised flowers on a large tree, if other and adjoining flowers were cross-fertilised. Of the flowers annually produced by a great tree, it is almost certain that a large number would be self-fertilised; and if we assume that the tree produced only 500 flowers, and that this number of seeds were requisite to keep up the stock, so that at least one seedling should hereafter struggle to maturity, then a large proportion of the seedlings would necessarily be derived from self-fertilised seeds. But if the tree annually produced 50,000 flowers, of which the self-fertilised dropped off without yielding seeds, then the cross-fertilised flowers might yield seeds in sufficient number to keep up the stock, and most of the seedlings would be vigorous from being the product of a cross between distinct individuals. In this manner the production of a vast number of flowers, besides serving to entice numerous insects and to compensate for the accidental destruction of many flowers by spring frosts or otherwise, would be a very great advantage to the species; and when we behold our orchard trees covered with a white sheet of bloom in the spring, we should not falsely accuse Nature of wasteful expenditure, though comparatively little fruit is produced in the autumn."

And here it may be asked, Why is it that so little has been done in the elucidation of function among tropical vegetation? At present the number of residents in the tropics who contribute anything to this department of knowledge is ludicrously small. During the last century the application of a mere convenience in nomenclature, coupled with that peculiar glory of a master, generous and utterly disinterested

sympathy with younger workers, conferred on Linnæus the privilege of heading a general movement having for its object the extension, to exotic vegetation, of the then best-known botanical method. It is much to be desired that observers imbued with the latest views should be found in all parts of the tropics. X.

Extracts and Abstracts.

The Nomenclature of Spiral-direction in Plants.

Sur la désignation de la direction des spires dans les plantes, par A. de Candolle. ("Bulletin de la Société botanique de France," tome xxiii., Séance du 9 juin, 1876.)—It is quite time that botanists should come to some agreement as to the direction intended when a given spiral or convolution is said to be right-handed, so as to distinguish it from the corresponding left-handed direction, and it is important that such distinction should stand on an intelligible basis and accord with the language of other sciences for similar cases. In this matter the above-mentioned note is well calculated to do full service. In the first place, it is obvious that rotation around an axis is a geometrical conception, and that the axis itself is in general the proper line from which the direction of rotation should be conceived; and therefore it is more appropriate to call that direction right-handed which appears so from the axis rather than that which appears so from some other points or lines in space wholly exterior to the rotating body or figure. In order to obtain a consistent plan for describing the direction of rotation or convolution, which shall apply in general to various kinds of bodies and conditions, it is necessary to make the rule dependent alone on the rotating or convoluted body itself, and entirely independent of the accidental position of any actual observer. For example, the direction of convolution of the corolla-lobes in a *Gardenia* is really the same whether an observer views it from above so as to look into the interior of the flower, or from one side so as to see the back only of some of the lobes, and similarly whether he examines the unfolded bud externally or a transverse section of it. The practice of some botanists, who prefer to adapt their terms to what they expect will suit the immediate convenience of an ordinary observer of the rotation or convolution under description, does not rest on a good philosophical basis, and is liable to run counter to a like convenience when the conditions are somewhat shifted, and consequently to give rise to confusion.

A. de Candolle shows that Linnæus adopted the just method of regarding the centre as the place from which the direction should be estimated, and that he was followed by other excellent botanists; the former forcibly points out that the right-hand side of an animal is that which is so to it and not to persons observing it. In like manner the right-hand side of the presidential chair in a public meeting is what appears as the left to the members of the assembly, and though

the convenience of the persons present might seem to be better consulted by the latter style of expression, yet the former is always and justly employed.

Until quite recent times the general practice of botanists has been tolerably uniform in following the lead of Linnæus; but unfortunately Dr. Asa Gray in America, and Mr. Bentham and Dr. Hooker in this country, have lately departed from it. In the first volume of their "Genera Plantarum" Bentham and Hooker do not appear to have noted the direction of convolution in the æstivation of those natural orders in which any occurs; in the first part of the second volume they describe contortion as towards the right or left, as the case may be (though reversing the Linnæan directions); but in the second part of the latter volume they modify their method of description by speaking of contorted corolla-lobes as covering over towards the right "dextrorsum obtegentes," or left. This latter method, however, does not completely get rid of the difficulty, for on placing the observer in the axis produced above the flower, or on making a section of the flower and looking down on it, the direction of the overlapping side is reversed from what it would be when viewing one side of the flower.

After the clear and satisfactory note of so competent and experienced a botanist as A. de Candolle, it is to be hoped that the rational rule of Linnæus, which regards the rotation of the hands of a watch as dextrorse and the contrary as sinistrorse, will be reverted to and universally maintained.

W. P. H.

Botanical News.

Articles in Journals.—January, 1877.

Monthly Microscopical Journal.—W. G. Smith, "Notes on Pollen" (tab. 167-170).

Scottish Naturalist.—J. W. H. Trail, "Scottish galls."—J. Stevenson, "On the recurrence of the rarer Fungi."—F. B. White, "On *Uredo filicum*, Desm., and *U.* (?) *pteridum*, n.sp."—J. Stirton, "New and rare Lichens."

Trans. Linn. Soc. Lond. (ser 2, vol. i., pt. 4, Jan. 4).—W. P. Hiern, "On the African species of the genus *Coffea*" (tab. 24).—G. Henslow, "On the origin of floral æstivations, with notes on structure of the Cruciferous flower, that of *Adoxa*, and corolla of *Primula*" (tab. 25).—R. S. Nelson and P. M. Duncan, "Points in histology of certain *Corallinaceæ*" (tab. 26, 27).—W. Archer, "On the minute structure and mode of growth of *Ballia callitricha*" (tab. 28, 29).

Hedwigia.—F. Kornicke, "Mycological notes" (contd.).

Bot. Zeitung.—H. de Vries, "On the expansion of growing cells from turgescence."—A. Fischer von Waldheim, "*Ustilago* of *Rumex maritimus*."—M. W. Beyernick, "On plant-galls."—J. B. Jack, "Hepaticæ Europææ" (tab. 1).

Flora.—L. Celakovsky, "On the morphological structure of *Vincetoxicum* and *Asclepias*" (tab. 1).—C. Kraus, "On relations of turgescence to growth-phenomena."—Reichenbach, "On a remarkable hybrid *Campanula* from Tyrol" (*C. barbata* × *Phyteuma hemispherica*). —A. Batalin, "Mechanism of movements of insect-eating plants."—V. A. Poulsen, "A new locality for Rosanoff's crystals."

Œsterr. Bot. Zeitschr.—"Memoir of A. Sauter" (with portrait). —"On the occurrence and origin of Etiolin and Chlorophyll in the Potato."—F. de Thumen, "Fungi nonnulli novi austriaci."—A. Kerner, "On *Paronychia Kapela*" (contd.).—J. Freyn, "On some Austro-Hungarian plants" (contd.).—F. Antoine, "Botany of the Vienna Exhibition."

Hungarian Journal of Botany (Magyar Növénytanilapok).—Address to Hungarian botanists.—A. Kanitz, "*Haynaldia*, gen. nov. Lobeliacearum."—F. Holuby, "Recent additions to Hungarian Moss-Flora."

Bull. Bot. Soc. France (1873, pt. 3).—M. Poisson, "Memoir of Grenier."—E. Mer, "Vegetative phenomena preceding and accompanying the fall of leaves."—A. De Candolle, "Terminology of the direction of spirals in plants."—M. Cornu, "Cultivation of *Melampyrum arvense* with the aid of Barley."—X. Gillot, "Monstrosities of *Tulipa Gesneriana*."—E. Roze, "Account of a cryptogamic excursion in the Bois de Meudon."—S. des Etangs, "Notes on some interesting plants."—D. Clos, "Etymological notes."—Ripart, "On new or rare Cryptogams for centre of France."—E. Prillieux, "Formation and development of some galls."—E. Mer, "Nature and functions of evergreen leaves."—Id., "Effect of immersion on aërial leaves."—Rouy, "New localities."—Van Tieghem, "Development of fruit of *Ascodesmis*, gen. nov. of Ascomycetes."

Nuovo Giorn. Bot. Ital—C. Massalongho, "Enumeration of Hepaticæ of Venetia."—N. Terraciano, "On a new variety of *Calystegia sylvatica*."—G. Briosi, "On the *Phytoptus*-disease of the Vine" (tab. 1).—Id., "On the function of chlorophyll in the Vine."—E. Levier, "*Androsaces Mathildæ*, sp. nov." (tab. 2).—H. Groves, "Contributions to flora of Terra d'Otranto."—G. Archangeli, "On a disease of the Vine" (tab. 3).—G. Cugini, "On the hairs of species of *Plantago*" (tab. 4-6).—O. Beccari, "On the organogeny of the female flowers of *Gnetum Gnomon*" (tab. 7).—Id., "On *Cardiopteris lobata*, Wall." (tab. 8).

Acta Horti Petropolitani (vol. iv., fasc. 1).—P. v. Glehn, "Plants collected in Witim-Olekma-Land by Poljakow and Maydell."—Trautvetter, "On the collections made during 1874 in Armenia by Radde, and in Daghestan by Becker."—Batalin, "Mechanism of movements of Insectivorous plants."

(Fasc. 3.)—Regel, "Descriptiones plant. nov. et minus cognit, fasc. 4."—Id., "Extracts from Report of Imp. Bot. Garden for 1875."—Trautvetter, "Plantæ a Radde in isthmus Caucasico anno 1875 lectæ."

New Books.—E. Bornet and G. Thuret, "Notes Algologiques, recueil d'observations sur les Algues." Fasc. I. (Paris, 1876. £1 4s.)

25 plates.—C. Darwin, "Fertilisation of Orchids," ed. 2 (Murray). —O. W. Thomé, "Text-book of Structural and Physiological Botany," translated by A. W. Bennett (Longmans, 6s).—G. Vasey, "Catalogue of the Forest Trees of the United States" (Washington, pp. 38).

We have been favoured by the Hon. Secretary of the West London Scientific Association and Field Club with the three first parts of its "Proceedings." It is certainly matter for congratulation that so flourishing a society devoted to natural science exists in London. The papers are of solid merit, as is to be expected from such observers as Rev. G. Henslow, Prof. Gladstone (President), G. S. Boulger, James Heywood, D. Vinen, and others. In fact, the Association appears to have obtained the support of a large number of the naturalists resident in the West End. There is little Botany in the "Proceedings," but the Club makes excursions in the spring and summer months, and the results of these are duly recorded.

Dr. Nordstedt, in conjunction with Dr. Wittrock, has published in the "Ofversigt" of the Stockholm Academy of Sciences (1876, no. 6), the *Desmidieæ* and *Ædogonieæ* collected by him in Italy and Tyrol in 1874. The numerous novelties are figured in two admirable plates accompanying the memoir.

Hungary now possesses a botanical periodical, the "Magyar Növénytanilapok" (Hungarian Journal of Botany), which is edited by Prof. A. Kanitz, of Clausenburg (Kolosvar). The first number appeared in January, and the original articles are noted above with those of other journals. There are, besides, resumés and reviews of recent books, botanical news, &c. We wish every success to Dr. Kanitz's periodical, which, however, from being written in Hungarian, can scarcely circulate much outside the kingdom.

The "Erdelyi Muzeum" (Transsilvanian Museum) for December, 1876, contains an enumeration of all known Hungarian Mosses, by Dr. A. Kanitz.

Guiseppe de Notaris died at Rome on January 22nd. He was born at Milan in 1805, and graduated at the University of Pavia in 1830. After some years as lecturer at the Lyceum of Milan, he was appointed in 1839 Professor of Botany and Director of the Gardens at Genoa, where he remained, with great advantage to the University and to science, till 1872, when, on the remodelling of the University of Rome, he was appointed Professor there. As a Cryptogamic botanist, he held a high place, and is the author of numerous memoirs, chiefly in the "Atti" of the Academy of Turin, on Mosses, Algæ, and Fungi. His funeral was a public one.

On the 3rd February, at her native place, Lowestoft, Suffolk, died Pleasance Smith (née Reeve), widow of Sir James Edward Smith, the purchaser, in 1784, of the collections of Linnæus, and the founder in 1788 and first President of the Linnean Society. On the 11th May next she would, had she lived, have reached the age of 104, having been born in the year 1773. Her marriage with Dr. Smith took place in 1796, and their house at Norwich was for many years afterwards the centre of the scientific life which then flourished in that city. Sir James's death occurred in 1828, so that his widow has survived him

nearly half a century. During his life a constant fellow-worker with her husband, she has, since her widowhood, done much to perpetuate his memory. The "Memoirs and Correspondence of Sir J. E. Smith," published in 2 vols. in 1832, was carefully edited by Lady Smith, and in 1857 she presented to the Linnean Society (through Dr. Boott) the whole scientific correspondence, admirably arranged by herself, in 19 quarto volumes. In the 9th of these volumes will be found many of her own letters to Sir James. The great age to which she had attained—about which, it may be remarked, no shadow of doubt can be possible—would lead one to expect that Lady Smith possessed an exceptional physique. Opie's portrait of her, taken in 1798, as a gipsy, exhibits remarkable physical beauty, and, as is often the case, this was accompanied by a very fine constitution. To the last, with the exception of failing eyesight since 1870, she retained all her senses, and her vigorous intellect remained unimpaired. In the Society which owes its existence to her husband's liberality and public spirit she always continued to take the liveliest interest, and as noted in this Journal at the time (1873, p. 190), an address, congratulating her on her 100th birthday, was presented to her by the Society in 1873. She made frequent donations to its library, the last being a copy of Passæus' "Hortus Floridus," in March, 1876; the sprightly letter accompanying this gift, though showing abundant evidence of loss of eyesight, equally displays an undiminished energy of mind. The funeral took place on the 9th, and was largely attended. A portrait at the age of ninety-four is given in the "Graphic," as well as a copy of Opie's portrait above alluded to.

The death has been recently announced of Roger Hennedy, late Professor of Botany in the Andersonian University of Glasgow, and author of the "Clydesdale Flora," 1865, of which a second edition was published in 1869.

M. Van Tieghem has been elected a member of the Academy of France, in place of the late Prof. Brongniart. The sale of the botanical library of the latter is stated to have produced 32,000 francs.

We have been asked by Dr. Robert Brown (Campst.) to contradict in the most positive manner the statement in our last number that he is a candidate for the vacant chair of Botany at Aberdeen. The error on our part was due to confounding him with the Rev. Dr. Brown, late Colonial Botanist at the Cape of Good Hope.

Corrigenda in last Number.

By an unfortunate omission a few pages of the last number of the Journal escaped correction. We regret to have to request our readers to correct several misprints.

P. 59, line 16 from bottom, *for* "precluded" *read* preluded.
" 2 " *for "Juniperinus" read Juniperus.*
" bottom line, *for "Cephalotanus" read Cephalotaxus.*
P. 60, line 10 from bottom, *for* "antheroids" *read* antherozoids.
P. 61, line 10, *for* "bases" *read* leaves.
" 31 and 32, the words "periblematists" and "value" should not be followed by full stops.
P. 62, line 29, *for* "sexual" *read* asexual.

Original Articles.

THIRD NOTES ON *EBENACEÆ*; WITH DESCRIPTION OF A NEW SPECIES.

By W. P. Hiern, M.A.

(Tab. 186.)

Four years have just elapsed since the publication of my Monograph of this Natural Order, and again a few additional points of interest require notice, and some fresh matter, either published subsequently to the Monograph or to my previous notes, or overlooked therein, must now be supplied.

With regard to the geographical distribution of the family, an important and instructive addition can now be made Early in the month of March of the year 1763, the Scandinavian botanist, Peter Forskål, a pupil of Linnæus and a member of Niebuhr's expedition, which was commissioned by Frederick the Fifth, King of Denmark, collected among other plants in the mountainous parts of Yemen, in Tropical Arabia, two species of *Ebenaceæ*. The specimens of these plants during the 114 years since elapsed do not appear to have been hitherto identified as belonging to this or to any other particular family; and no species of the family has been previously recorded from Arabia. The specimens seen by me form part of the herbarium of the late Professor Nolte, which has been recently acquired by the Department of Botany in the British Museum; they were both gathered among the Hadie mountains, between El Urs (Ersch) and Aludje, about six hours' journey towards the east from Beit el Fakih, and about fourteen degrees and a half of latitude north of the Equator.

One of the species referred to is a *Euclea*, apparently intermediate between *E. Kellau*, Hochst., and *E. undulata*, Thunb., if not indeed a variety of the former; the specimen consists of a leafy branch bearing short axillary racemose cymes, but without either flowers or fruits extant, and appears to have belonged to a female plant. In consequence of the poverty of the specimen's condition it would be unsafe to speak positively as to the precise species, though I feel confident that the plant is a *Euclea*, very nearly related to *E. Kellau*, but with leaves more wavy and rather broader in figure; it may therefore be regarded either as a form of this species, which is otherwise exclusively Abyssinian, or as an undescribed species to be placed between it and *E. undulata*. The latter species ranges over the eastern districts of the Cape of Good Hope, the Kalahari region, and the Transvaal Republic. On the ticket attached to the specimen is written: "Ignota arbor—an Nakås Hadiensis inter Ersch et Aludje"; this, no doubt, refers to the plant mentioned in Forskål's posthumous work, "Flora Ægyptiaco-Arabica" (1775), among the unknown plants, on page 197, n. xxix., under the Arabian name of Nakus, which is also a native of the Hadie

mountains and is described in the book as follow: "Frutex: *foliis* oppositis lanceolato-cuneatis, apice rotundatis, sesquipoll. integris, glabris, sessilibus, vel breviter petiolatis, rigidis." This description agrees with the Abyssinian specimens of *Euclea Kellau* rather better than does Forskål's specimen seen by me.

The other Ebenaceous species found by Forskål in Tropical Arabia appears to be identical with *Diospyros mespiliformis*, Hochst.; the latter is very widely distributed over Tropical Africa, occurring from Senegambia to Nubia and Abyssinia, and from Angola to the Mozambique district, and therefore its extension to Yemen cannot be considered as greatly opposed to antecedent probability. The specimen consists of a fruiting leafy branch; but unfortunately the fruits are wanting, and the leaves and the fragmentary bases of two fruiting calyces only remain on the branch; nevertheless, I think that the identification of the species is determined beyond reasonable doubt, though not with absolute certainty. The only other species that it closely resembles is *Diospyros hirsuta*, Linn. f., which is a variable species widely distributed over British India, and is well represented in Africa by the above-mentioned *D. mespiliformis*. On the ticket attached to the specimen is written: "Ignota arbor—Besúss—inter Ersch et Aludje"; this may perhaps refer to the plant mentioned in Forskål's Flora, p. 196, n. xxii.: "Bsuss."—"Surdûd. Foliis alternis, lanceolatis, subspith. integris, breviter petiolatis; squamis ad basin folii." There is, no doubt, some difficulty in explaining what could be meant by the scales at the base of the leaf mentioned in the description quoted above, unless indeed allusion is made to the deciduous scales at the base of the young branches which are occasionally noticeable in the specimens of *D. mespiliformis* even in the herbarium. Surdûd is a locality among the mountainous districts of Yemen, where the flora is similar in character to that of the Hadie mountains; and apparently the same plant is given on page xcvi, and arranged among the dense and fine woods suitable for building purposes, and of unknown genera, under the Arabian name of Bsass.

Of the genus *Maba* a few species must be added. In the tenth volume of the Memoirs of the Academy of Lyons, published in the year 1860, P. Montrousier published two species from the island of Art, near New Caledonia. I have seen neither of the plants, and from the descriptions given by him I cannot identify them with species known to me, and I therefore merely repeat his characters, which are as follows:—

Maba glauca, *Montr.* in Mém. Acad. Lyon. x., p. 230.

Frutex ramosissimus, 5-6-pedalis, ramuli foliaque etiam juniora glabra, sæpe glauca. Folia ovalia, breviter petiolata, basi attenuata, margine vix revoluta, apice obtusa, subavenia, 2 poll. longa, 1 poll. lata, coriacea. Pedunculi 2-flori, multoties folio breviores, solitarii in floribus femineis, terni in masculis. Calyx puberulus, semi-3-fidus, fructifer auctus, 3-gonus, interius lævis. Corolla semi-3-fida, extus puberula, albo-lutea, lobis revolutis. Stamina 9, omnino libera. Stigma 3- nunc 2- partitum. Bacca globosa, glauca, vix semi-pollicaris, 2-6-sperma.

Maba rosea, *Montr.*, l.c., p. 231.

Ramuli foliaque etiam recentissime glabra. Folia ovata vel

ovato-oblonga, petiolata, plerumque apice rotundata, nunc subacuminata, margine subreflexa, basi attenuata, penninervia, supra lucida, infra 2-4 glandis oblongis basi nervi principalis instructa, 2-4½ poll. longa, 1-1½ lata, petiolo 2-3 lin. longo. Flores masculi terni, sæpius dense conglomerati, ramulis insidentes. Pedunculi nunc bractea instructi. Calyces 2-3 lin. longi, campanulati, sub-3-fidi, puberuli, virides, lobis ovato-obtusis. Corollæ conicæ, calycibus sub-duplo longiores, extus sericeo-tomentosæ, roseæ, sub-3-fidæ, lobis ovato-acutis. Stamina 9, erecta, toro pubescente inserta nec corollæ; filamenta antheris subæqualia. Flores feminei adhuc ignoti.

Mr. S. Kurz, in a sketch of the vegetation of the Nicobar Islands, published in the Journal of the Asiatic Society of Bengal, volume xlv., part 2, no. iii., p. 138, n. 270 (1876), has described in the following terms

MABA ANDAMANICA.

Frutex sempervirens, 3-5-pedalis, novellis ochraceo-hirsutis vel pubescentibus; folia elliptica ad ovato-oblonga, petiolo brevissimo brunneo-tomentello suffulta, basi subcordata, abrupte acuminata vel apiculata, integra, 4-6 poll. longa, chartacea, supra glabra, subtus secus costam nervosque adpresse fulvo-puberula, laxe reticulata; flores feminei tantum noti, 3-meri, axillares, sessiles, solitarii; calyx profunde 3 lobus, lobis acutis, parce pilosis; baccæ subsiccæ, elliptico-oblongæ vel oblongæ, plus quam pollice longæ, stylo mucronatæ, læves, sæpius 3-spermæ; semina lineari-oblonga.

This plant had been previously called *Macreightia* (Marcreightia) *andamanica* by Mr. Kurz in his report on the vegetation of the Andaman Islands, p. 42, 2nd edition (1870), but without description, and has been in the meantime referred by him to *Maba sumatrana*, Miq.; it was noted by me in the Monograph, page 124. The description quoted above does not enable me to fix its exact position in the genus, and the specimen from South Andaman which was seen by me is without either flower or fruit.

Among the specimens collected by Mr. H. N. Moseley, of the *Challenger* Expedition, there is a species of *Maba* from the Aru Islands, in the Indian Archipelago, gathered in fruit in the month of September, 1874, which appears to be an undescribed species allied to *M. buxifolia*, Pers.; but the material at hand is not sufficient to enable me to classify it fully, and therefore I deem it best not to publish it under a new name.

The following is a new species from Samoa:—

MABA SAMOENSIS, *Hiern*.—M. rigida, foliis ellipticis vel ovato-ellipticis apice obtuse angustatis basi subcuneatis glaberrimis coriaceis crebre præsertim subtus reticulatis utrinque concoloribus margine undulatis breviter petiolatis, floribus femineis secus ramulos lateralibus axillaribusque in cymis brevissimis 1-3-floris sæpe approximatis demum patulis recurvisve dispositis, pedicellis brevissimis appresse fulvo-pubescentibus, calyce trifido appresse pubescente, fructibus solitariis oblongis subfusiformibus curvis vel subrectis apice obtusis lobulato-umbilicatis obsolete pubescentibus nigrescentibus 2(-3)-locularibus loculis 1-2-spermis, albumine non ruminato.

Habitat.—In insulis "Samoa," a reverendo *S. J. Whitmee*, n. 3, lecta et in herbario Kewensi a me visa.

Ramuli alterni rigidi nigro-cinerei glabrati papilloso-punctati erecto-patentes. Folia alterna rigide coriacea 4-7 pollices longa $1\frac{3}{4}$-$3\frac{1}{4}$ pollices lata, costa supra impressa subtus robuste prominente, nervis cum venis utrinque expressis; petiolo $\frac{1}{8}$-$\frac{1}{4}$ poll. longo robusto. Bracteæ deciduæ, ut videtur parvæ. Calyx fructifer inferus extus appresse pubescens intus fulvo-velutino-tomentosus, tubo plus minusve complanato $\frac{3}{8}$ poll. diam., lobis 3 deltoideis obtusis reflexis vel patulis $\frac{1}{3}$ poll. latis $\frac{1}{5}$ poll. altis. Baccæ sesquipollicares, ut videtur subsiccæ. Semina utrinque acute angustata basi attenuata pollicaria vel ultra, dorso rotundato, lateribus vel facie planis; albumine corneo albido; radicula supera terete subclavata $\frac{1}{3}$ pollicari vel ultra; cotyledonibus membranaceo-foliaceis.

Flores masculi cum florum femineorum corolla adhuc ignoti.

Species nova in generis sectione *Ferreola* inter *M. Hillebrandii*, Seem., et *M. ellipticam*, Forst., ponenda. [Tab. 186.]

Recently, through the kindness of Dr. M. C. Cooke, of the India Museum, I have had an opportunity of examining mature seeds of *Diospyros Embryopteris*, Pers., from the botanical gardens of Saharunpore. Upon this species Gærtner founded his genus EMBRYOPTERIS, taking his characters from the fruit and seeds, and obviously deriving the name from the presumed structure of the embryo. Unfortunately, Gærtner was mistaken as to the true structure of the plant, and the seeds that had been communicated to him could not have been in good condition. He describes and figures the calyx as superior, the berry as inferior and one-celled, the seeds as compressed, and the embryo as monocotyledonous (Gærtner, "De Fructibus," vol. i., pp. 145-46, tab. xxix, fig. inf., anno 1788). Several of these mistakes are sufficiently obvious on a superficial observation of the fruits, and Persoon, in the year 1807, rightly reduced the species to the genus *Diospyros;* but I am not aware that the embryo of this species has been yet accurately ascertained and described. The fruit is usually gathered in India while yet immature, for the sake of the large quantity of tannin which it then contains, and consequently the specimens that commonly come to hand do not possess fully-developed seeds. The ripe seeds measure about two-thirds of an inch in (vertical) length, nearly half an inch in breadth (*i.e.*, in a horizontal and radial direction to the axis of the fruit), and nearly a third of an inch in thickness. The seeds in the dry state are enclosed in a papery separable envelope, which in the fresh state was probably of a viscid consistency. The inner vertical edge is nearly straight, parallel and contiguous to the axis of the fruit; from this edge its two sides diverge in vertical planes to meet the outer rounded back which in the vertical direction follows the curvature of the pericarp. The testa is reddish and rather thicker than is usual in *Ebenaceæ*, and somewhat spongy in texture, and in places it slightly intrudes into the pale, hard, abundant albumen; but this intrusion is so insignificant that I think it can scarcely be said to amount to rumination, a condition which occurs in some species of the genus. The embryo is fully half an inch long, and lies in the midst of the albumen, descending from the inner side of the apex of the seed; the radicle is superior, terete, scarcely a quarter of

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MABA SAMOENSIS *Hiern*

an inch long, and is rather thicker towards its apex; the cotyledons are oval, membranous-foliaceous, and broader and rather longer than the radicle.

As regards fossils, since my last notes, two species have been published by Professor Heer in a paper entitled "Ueber fossile Früchte der Oase Chargeh," extracted from "Denkschriften der Schweizerischen Naturforschenden Gesellschaft," vol. xxvii. (1876). These fossils were collected in the interior of Africa in the winter of 1874 by Dr. George Schweinfurth in the oasis of Chargeh, about 25° north latitude, in the Libyan Desert; the geological age is Upper Cretaceous, and a palm-fruit was found in the same beds. The descriptions given by Professor Heer are as follows: —

Diospyros Schweinfurthii, Heer, Foss. Fl. Oase Chargeh, p. 6, n 1, fig. 1-10.—D. fructibus depresso-globosis, subcostatis, 18-22 mm. latis, octolocularibus, loculis monospermis, marginem attingentibus.

Hab.—El Chargeh, at the foot of Gebel Rennihma and of Gebel Taruan, under the white chalk of *Ananchytes ovatus*.

Royena desertorum, Heer, Foss. Fl. Oase Chargeh, p. 10, n. 2, fig. 11-16.—R. fructibus depresso-globosis, dehiscentibus, 14-15 mm. latis, sexlocularibus, loculis monospermis.

Hab.—El Chargeh, at Gebel Taruan.

A third fossil species has been described by Professor Heer as follows:—

Diospyros Prodromus, Heer, Flora Foss. Arctica iii, Kreide-Flora der Arstische Zone, p. 112, t. xxviii., f. 6 *c*, t. xxxii., f. 3-7 (1874).—D. foliis ovato-ellipticis, summa basi paululo in petiolum attenuatis integerrimis; nervis secundariis distantibus, valde camptodromis, arcibus a margine remotis; calyce 5-lobo.

Hab.—Atane et Atanekerdluk, North Greenland; Cenomanian (Upper Greensand).

Explanation of Tab. 186.

The principal figure shows, natural size, the upper portion of a branch of *Maba samoënsis* with leaves persistent above and fruits below. Fig. 1 shows, also natural size, the lower portion of a detached fruit cut across above the base; there are two unequal cells, the larger cell containing two collateral seeds, and the smaller cell only one seed; at the base of the fruit is seen part of the trifid recurving calyx. Fig. 2 shows an entire seed removed from the fruit, also natural size.

REVISION OF THE KERGUELEN LICHENS COLLECTED BY DR. HOOKER.

By the Rev. J. M. Crombie, F.L.S., &c.

In my "Enumeration of the Kerguelen Lichens" collected during the recent Venus Transit Expedition, in Journ. Linn. Soc. Bot., vol. xv., pp. 180-193, I stated that I purposed giving a revision of those collected by Dr. Hooker during the voyage of H.M. discovery-ships *Erebus* and *Terror*, and now deposited in the Royal Herbarium at Kew. These were originally recorded and described by Dr. Thomas Taylor in the "London Journal of Botany," vol. iii. (1844), pp. 634-

658, where the following seventeen species are recorded from this singular island :—

Lecidea.
L. geographica (L.).
L. stellulata, Tayl.
L. confluens, Ach.
L. rivulosa, Ach.
L. aromatica, Ach.
Urceolaria.
U. endochlora, Tayl., sp.n.
U. macrophthalma, Tayl., sp.n.
Lecanora.
L. gelida, Ach.
L. tartarea, Ach.
L. subfusca, Ach.
L. dichroa, Tayl., sp.n.
Peltidea.
P. canina, Ach.
P. venosa, Ach.
P. horizontalis, Ach.
Cladonia.
C. phyllophora, Tayl., sp.n.
Stereocaulon.
S. paschale, Ach.
Usnea.
U. Taylori, Hook. fil., sp.n.

In giving the above list Dr. Taylor evidently had not all the specimens collected by Dr. Hooker before him, as may with certainty be inferred from a subsequent and larger list by the Rev. Churchill Babington. This is recorded in Dr. Hooker's "Flora Antarctica," vol. ii. (1847), pp. 519-542, in which we find twenty-four species and varieties enumerated. These are as follows :—

Usnea.
U. Taylori, Hook. fil.
Ramalina.
R. scopulorum, var. ϵ.
Peltidea.
P. venosa, Ach. ?.
P. horizontalis, Ach.
Stereocaulon.
S. corallinum, Fr.
Lecanora.
L. gelida, Ach.
β. vitellina, Bab.
L. murorum var. *farcta*, Bab.
L. citrina, Ach.
L. erythrocarpia, Fr.
L. melanaspis, Ach.
L. molybdina, Ach.
L. tartarea, Ach.
L. subfusca, var. *epibryon*, Ach.
L. candelaria.
Urceolaria.
U. endochlora, Tayl.
Lecidea.
L. aromatica, Ach.
L. albo-cærulescens, Ach.
L. spilota, Fr.
L. contigua, var. *hydrophila*.
L. fusco-atra.
L. stellulata, Tayl.
L. geographica, var. *urceolata*.
Pertusaria.
P. communis.

On comparing these two lists we find that both *Cladonia phyllophora* and *Peltidea canina* are entirely omitted in the latter, owing, no doubt, to the specimens so named not having been returned by Dr. Taylor. Babington also regards *Urceolaria macrophthalma*, Tayl., as identical with *Lecanora gelida*, and *Lecanora dichroa*, Tayl., as a synonym of *L. melanaspis*, Ach. ; while with respect to *Lecidea confluens* and *L. rivulosa* of Taylor's list, he refers the former to *L. albo-cærulescens*, and the latter to *L. spilota*—all of which, however, are erroneous. Some of the others in Babington's list, such as *Lecanora citrina*, *L. erythrocarpia*, *Lecidea contigua*, var. *hydrophila*, are confessedly named from imperfect specimens and regarded as doubtful

determinations. So also both authors agree in regarding *Peltidea venosa* as doubtful.

Subsequent to the publication of the "Flora Antarctica," Dr. Nylander, when on a visit to London, examined such specimens as were then available in the Kew Herbarium, and indicated some of the results in his "Enum. Gen., &c." It would appear, however, that the specimens sent to Babington for determination had either then not been returned, or had been overlooked in consequence of a portion at least of them having been placed in a small unlabelled box in the Cabinet apart from the others. These having recently been again brought to light enable me to give a fuller revision of Dr. Hooker's Kerguelen Lichens than would otherwise have been possible in the very unsatisfactory and scattered state in which the other specimens not incorporated in the general Herbarium occurred in the Cabinet.

The result of such revision will sufficiently appear from the following amended list:—

Amphidium, *Nyl.*

A. molybdoplacum, Nyl. (= *Lecanora melanaspis* of Bab. excl. syn. *L. dichroa*, Tayl.).

Stereocaulon.

S. cymosum, Cromb. (= *S. paschale* of Tayl. and *S. corallinum* of Bab.). As the specimen, though infertile, is otherwise in better condition than the more fragmentary ones collected by Mr. Eaton, I may here give the following fuller diagnosis:—

Thallus podetiis validis pallidis nudis (altit. 2-3 centimetrorum, crassit. basi 3-4 millim., superius tenuioribus), longitrorsum obsolete plicato-sulcatis, fere dimidia altitudine dendroideo ramosis et ramis ramulisque granulis albidis coralloideis subleprose solutis tectis, unde cyma fingitur subleproso-granulosa, densa et quasi continua (vel subconcrescens). Cephalodia subglobosa, demum fusca, gonimiis moniliformibus minutis (diam. 0 003-4 millim.).

Granula thalli *K* citrine flavent. Statura robusta, cyma latit. circiter 4 centimetrorum.

Cladonia.

C. acuminata (Ach.), Norrl. (= *Cl. phyllophora*, Tayl.). The specimen occurs amongst those sent to Babington, but without any label, or any notice in his list, though it answered sufficiently to Taylor's description.

Neuropogon.

N. Taylori (Hook. fil.) (= *Usnea Taylori* of Tayl. and Bab.). The specimens are more robust than those gathered by Mr. Eaton.

Ramalina scopulorum, var. ϵ., given in Fl. Antarct., p. 522, as collected by Anderson in Kerguelen, is no doubt to be referred to some *Neuropogon*, as no species of *Ramalina* occurs in the island.

Peltigera.

P. rufescens, var. *spuria* (DC.) (= *Peltidea venosa*, of Tayl. and Bab.). A single infertile fragment returned by Babington evidently belongs to this, and certainly is not referable to *Peltidea venosa*.

P. polydactyla, f. *hymenina* (Ach.) (= *Peltidea horizontalis* of Tayl. and Bab.). No specimen has been preserved of *P. canina* enumerated by Taylor.

Pannaria.

P. dichroa (Tayl.) (=*P. placodiopsis*, Nyl.). Babington in Fl. Antarct., evidently by an error of transcription, refers Taylor's plant (of which the original label has become almost entirely obliterated) to *Lecanora melanaspis*, Ach., instead of to *L. molybdina*, Ach., to which it externally bears some faint general resemblance.

Lecanora.

L. (*Placopsis*) *gelida* (L.) (= *L. gelida* of Tayl. and Bab., and β. *vitellina* of Bab.). Var. β. is intermediate in colour between the type and f. *lateritia*, Nyl., of which latter a single infertile specimen occurs in Hb. Hooker.

L. (*Placopsis*) *macrophthalma* (Tayl.), Nyl. (= *Urceolaria macrophthalma* of Tayl.).

L. (*Placodium*) *elegans*, Ach. (= *L. murorum*, var. *farcta*, Bab.). This is a state with crowded apothecia and spores 0,012-15 mm. long, 0,006-7 mm. thick.

L. vitellinella, Nyl. (= *L. candelaria* of Bab.). The small infertile fragment is evidently referable to this species.

L. broccha, Nyl. (= *L. subfusca*, var. *epibryon* of Bab.). Probably this is also *L. subfusca* of Tayl., but I can find no specimen labelled in his handwriting.

L. atro-cæsia, Nyl. (= *Lecidea confluens* of Tayl., and *Lecidea albo-cærulescens* of Bab.).

Of *L. citrina*, Ach., and *L. erythrocarpia*, Fr., enumerated by Babington as doubtful determinations, there are no specimens whatever to be found in Hb. Hook., and they may with propriety be omitted from any future list of Kerguelen Lichens.

Pertusaria.

P. perrimosa, Nyl. (= *P. communis* of Bab.). To this also I suspect that *Lecanora tartarea* of Tayl. is referable, but no specimen so labelled has been preserved.

Lecidea.

L. assimilata, Nyl. (= *L. aromatica* of Tayl. and Bab.). The specimen labelled "Kerguelen," but without any name attached, occurs in the Cabinet along with others of the true *L. aromatica*.

L. amylacea, Ach. (= *L. spilota* of Bab.). According to Bab. Fl. Antarct., p. 538, *L. rivulosa* of Tayl. (of which there is no specimen so named in Hb. Hook.) is referable also to the present species.

L. subcontinua, Nyl. (= *Urceolaria endochlora*, Tayl., *nomen informe et absurdum*). Three different species occur in Hb. Hook., s.n. *Urceolaria endochlora*, or at least in association with it; but that this is the one Taylor had in view may easily be inferred from his diagnosis, where he speaks of the "lamina resting on an inverted cone of black matter extending to the bottom of the thallus" (that is the black hypothecium), which does not apply to either of the other species.

L. HOMALOTERA, *Nyl. in Hb. Hook.*, sp.n. (= *Urceolaria endochlora*, Tayl. pro p.). "Thallus albidus, tenuis, lævis, rimulosus (K +, I —), nigricanti-limitatus; apothecia nigra, innata, plana (vel depressiuscula), submarginata (latit. 1 mm. vel minora), intus dilutiora, a thallo circumscissa; sporæ 8næ, ellipsoideæ, longit. 0,009-0,013 mm., crassit. 0,004-6 mm., epithecium obscure cærulescens, paraphyses non distinctæ, hypothecium incolor. Iodo gelatina hymenialis vix tincta, at thecæ cærulescentes.

"Est species e stirpe *Lecideæ planæ*, Lahm, notis allatis satis distincta; spermatia recta, longit. 0,006-8mm., crassit. 0,001 mm." Nyl. in *litt.*

L. DISJUNGENDA, *Cromb.*, sp.n. (= *Urceolaria endochlora*, Tayl. prop).

Thallus albidus vel passim albido-plumbeus, tenuis, lævis, rimulosus, nigro-limitatus (K + flaneus, I —); apothecia nigra, innata, plana immarginata (latit. 0,5-0,7 millim.), sæpe thallo circumscissa; sporæ 8næ, incolores, ellipsoideæ, simplices, longit. 0,011-13 millim., crassit. 0,007-9 millim., paraphyses gracilescentes, epithecium cærulescens, hypothecium incolor (vel leviter rufescens).

"Species est vicina *Lecideæ diasemoidi*, quacum spermatiis convenit, sed thallo et apotheciis omnino divergit. *L. subassentiens* differt thallo, apotheciis et spermatiis." Nyl. in *litt.*

L. assentiens, Nyl. (= *L. contigua*, var. *hydrophila* of Bab.). The specimen, as Babington acknowledges, is quite indeterminable, but, judging from its general aspect, most probably belongs to the above species.

L. perusta, Nyl. (= *L. fusco-atra* of Bab.). The specimen present is an old and sterile condition, which, but for comparison with those of Mr. Eaton, wou'd be indeterminable.

L. geographica (L.) (= *L. geographica*, var. *urceolata* of Bab.).

Unfortunately I have been unable to detect any specimen of *Lecidea stellulata*, Tayl., from Kerguelen. Taking into account, however, its extended distribution, it probably occurs in that island, though, in the absence of microscopical examination, it may readily be confounded with other allied species.

Of *Isidium oculatum*, *Isidium lutescens*, and *Lepraria flava*, enumerated by Babington from Kerguelen, there are also no specimens preserved in Hb. Hooker; and as they evidently have respect to some isidioid and leprose states of other Lichens (indeterminable), their absence is no loss whatever to Lichenological science.

APPENDIX.

I may here embrace the opportunity of making a few observations upon certain of the Kerguelen Lichens collected by Dr. Kidder, the Naturalist of the United States Venus Transit Expedition, and recorded by Professor Tuckerman in Bull. Torrey Bot. Club, vol. vi., no. 10. This collection in number of species is very inferior to that made by the Rev. A. E. Eaton, amounting only (after deducting the 3 species enumerated by Tuckerman from Hb. Taylor) to 15 species. Of these which require any remarks briefly in their order, as recorded and

described by Tuckerman, l.c., who, unfortunately neglecting the chemical reactions (which cannot in the present state of Lichenological science be with propriety ignored), renders his diagnoses incomplete and so far uncertain.

1. *Usnea sulphurea* (Mull.), Th. Fr. = *Neuropogon melaxanthus* (Ach.), Nyl. With respect to the specific name, Nylander long ago observed to me *in litt.*, "Nomen *Usnea sulphurea*, Koen., respicit formam depauperatam sterilem, ramulis plus minus dengratis, arcticam." Tuckerman also seems to imply that *Neuropogon Taylori* (Hook. fil) cannot rightly be discriminated from the preceding, but I find no difficulty whatever in doing so by attending to the characters of the latter given in Nyl. Syn., p. 273..

2. *Pannaria Taylori*, Tuck., sp.n. This is evidently identical with *Pannaria dichroa* (Tayl.).

3. *Pannaria glaucella*, Tuck., sp.n. = *Amphidium molybdoplacum*, Nyl.

5. *Placodium bicolor*, Tuck., sp.n. This is undoubtedly referable to *Placopsis gelida*, f. *lateritia*, Nyl., with which the character of the gonimia in the cephalodia and the measurement of the spores as given by Tuckerman correspond. No cephalodia occur in any known species of *Placodium*, and though Tuckerman describes the spores of his plant as "polari-bilocular," yet they are not truly placodiomorphous. Occasionally indeed in *Placopsis gelida* they present somewhat of this appearance in consequence of the protoplasm in drying becoming retracted and variously arranged, but this has nothing in common with the spores of *Placodium*, in which the protoplasm occurs in apical cavities of the solid spore.

7. *Lecanora Hageni* (Ach.). On one of Mr. Eaton's specimens I observed similar apothecia to those referred by Tuckerman to the present species, but as in neither case were they sufficiently developed, it seems better to omit the plant altogether.

9. *Urceolina Kergueliensis*, Tuck., n.gen. et sp. = *Lecanora Kerguelensis* (Tuck). According to Nyl. *in litt.*, Tuckerman's plant is a *Lecanora* belonging to the group of *L. subfusca-galactina*.

13. *Lecidea endochlora* (Tayl.). As no analysis of this species is given by Tuckerman, it is of course impossible to say with certainty to which of the three species labelled *Urceolaria endochlora* in Hb. Hooker this is referable, though as Taylor no doubt retained a typical specimen for his own herbarium, we may assume that it is *Lecidea subcontinua*, Nyl.

14. *Lecidea fusco-atra*, Ach., Fr. = *Lecidea perusta*, Nyl.

15. *Buellia parasema* (Ach.). This is probably to be referred to *Lecidea myriocarpa*, DC.

Of the others enumerated by Professor Tuckerman, *Lecidea inundata* (Fr.), *Lecidea enteroleuca*, Fr., and *Verrucaria chlorotica* (Ach.), are, along with *Lecanora Kerguelensis* (Tuck.), additions to the list of the Kerguelen Lichen-Flora.

I may take this opportunity also to mention that *Lecanora macrophthalma* (Tayl.), Nyl. in Flora, 1858, p. 489, note, is in reality a *Placopsis*, of which Nylander has just favoured me with the following ampler diagnosis:—"Thallus ambitu sæpe nonnihil sublobato-effiguratus; gonidia e syngonidiis consistunt compositis, quæ gonidia

parva numerosa aggregata vel fere gonidimia sistunt; cephalodia rosello-lutescentia planiuscula vel convexiuscula, innata (latit. fere 2 millimetrorum), rhagadiose diffracta vel rimosa, syngonimiis subscytonemoideis." (Nyl. *in litt.*)

DATES OF SIR J. E. SMITH'S ARTICLES IN REES'S "CYCLOPÆDIA."

By B. D. Jackson, F.L.S.

[The botanical articles in Rees's "Cyclopædia" were contributed by Sir J. E. Smith from towards the conclusion of the letter C to the end of the alphabet, with the exception of a few by his friend the Rev. W. F. Drake. The earlier contributions were by Mr. Wood, of Leeds, who died suddenly in 1808 in the middle of writing the article *Cyperus*. Smith put an S. to the articles for which he wished to be responsible or thought worth owning. The communications he sent amounted to 3348, besides 57 lives of botanists. (See Lady Smith's "Memoir of Sir J. E. Smith," i., p. 448.)

It is of great importance to know accurately the date of publication of the systematic articles in which many new species are described, but there is no clue in the book itself, except the date 1819 on the titles of all the thirty-nine volumes of this extensive work. Mr. B. D. Jackson having been requested to investigate and endeavour to ascertain the actual dates, has kindly sent the following information. —*Ed. Journ. Bot.*]

The "Cyclopædia" was issued at uncertain intervals in parts, two of which usually went to make up a volume, and, on the completion of the work, title pages were issued for all the volumes, bearing the date of the last—namely, 1819—for thirty-nine volumes of letter-press and one volume of maps, and 1820 for five volumes of plates. I at first endeavoured to compile the dates from the foot of each plate, but each series of plates was not issued complete with its accompanying letter-press, but at intervals, in some cases extending over the whole period of publication. The usual references to the Booksellers' Lists give no satisfaction beyond the price of the entire production. I then wrote to the publishers, but in their reply they informed me that their books for the time of publication were no longer in existence. My only resource, consequently, was to examine the pages of the "Monthly Literary Advertiser," which commenced May 10, 1805, in hopes to gather up from chance advertisements some fragments which might be acceptable, instead of the impracticable whole. I trust that what follows may be taken as a tolerably correct account of the issue of the work, although I cannot guarantee the absolute accuracy of the dates and similar information.

I here give a tabular statement derived, as I have mentioned, from sundry announcements in the "Monthly Literary Advertiser." This serial was published on the 10th of each month, or the 9th if the 10th happened to fall on Sunday. I have quoted the month named in this periodical, so that in many cases I have attributed the date possibly a month later than the fact. Additions of my own, as usual, are marked

by being enclosed in square brackets. I have also furnished the first and last article in each part or volume respectively, so that even where definite information is wanting, owing to the numerous gaps in the source of information, a shrewd guess may be made at the approximate dates of intervening articles.

Volume.	Part.	Date.	First Article.	Last Article.
[VI.]	11	March, 1806.	Calvary.	Cape of Good Hope.
[VII.]	15	January, 1807.	Chronometer.	Clavaria.
[VIII.]	16	August, 1807.	Clavaria.	Colliseum.
[IX.]	17	December, 1807.	Collision.	Congregation.
[X.]	19	May, 1808.	Cornea.	Croisade.
[XII.]	23	March, 1809.	Dissimulation.	Dynamics.
[XII.]	24	June, 1809.	Dynamics.	Eloaux.
[XIII.]	26	December, 1809.	Equation.	Extremum.
[XV.]	29	July, 1810.	Ford.	Froberger.
XVI.	1, —	December, 1810.	Generation.	Griewe.
XVI.	2, —	January, 1811.	Gnoien.	Gretna Green.
XXIII.	2, 46	April, 1813.	Metals.	Monsoon.
XXXII.	1, —	March, 1816.	Scotland.	Shammy.
XXXIII.	2, —	August, 1816.	Sound.	Starboard.
XXXIV.	1, —	November, 1816.	Starch.	Stuart.
[XXXIV.	2] 68	"Dec. 20," 1816.	Stuart.	Szydlow.
[XXXVI.]	72	"Oct. 24," 1817.	Tumours.	Vermelho.
[XXXVII.]	73	"Dec. 23," 1817.	Vermes.	Union.
[XXXVIII.]	75	"May 28," 1818.	Water.	Whitby.
[XXXVIII.]	76	July 31, 1818	Whitby.	Wyetin.
XXXIX.	1, —	January, 1819.	X.	Baldwin.
XXXIX.	2, —	Novem., 1819.	Baldwin.	Zollikofer.
[Plates ?]	Last part	August, 1820.	———	———

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. Holmes, F.L.S

(*Continued from p.* 85.)

Grimmiaceæ.

Cinclidotus fontinaloides, *P. Beauv.*

On stones and piles in streams. April, May. Bry. Eur. iii., t. 277.

On woodwork, banks of the Medway, near Maidstone.

Schistidium apocarpum, *Br. & Sch.* *Grimmia apocarpa*, Br. & Sch. (Hobk.).

On walls and on stones in streams, &c. Winter. Bry. Eur. iii., t. 233, 234.

Otford; Shoreham, on the base of the trunk of a tree; Hothfield, near Ashford; Brenchley.

Var. *β. gracile*, Wils. Bry. Eur iii., t. 234.

On the roof of an outhouse near Rusthall Common.

Grimmia pulvinata, *Sm.*

On walls, roofs, &c.; common. March. Bry. Eur. iii., t. 239.

Greenhithe; *George!* Southborough, *Fawcett;* Otford; Hythe; Ightham; Lydd.

G. TRICHOPHYLLA, *Grev.*

On rocks and walls in subalpine districts; rare, not common in fructification. May. Bry. Eur. iii., t. 244.

Ightham Woods, on an old wall, with young fruit. February, 1876.

[*Grimmia orbicularis*, Br. & Sch. Should be looked for in February on limestone walls. It may be readily distinguished from *G. pulvinata* by its convex, not beaked, lid and dimidiate calyptra]

RACOMITRIUM ACICULARE, *Brid.* *Trichostomum aciculare*, Web. & Mohr. (Fl. T. Jenner).

On rocks and on stones in streams. Winter. Bry. Eur. iii., t. 262.

On Rusthall Common, abundant; *Jenner Tunbr.*

R. HETEROSTICHUM, *Brid.* *Trichostomum heterostichum*, Hedw. (Jenner Tunbr.).

On rocks and walls in subalpine districts; rare. March. Bry. Eur. iii., t. 265.

On a wall in Ightham Woods, with fruit. February, 1876.

R. CANESCENS, *Brid.* *Trichostomum canescens*, Hedw. (Jenner Tunbr.).

On sandy heathy places; not common. The fructification rather rare. March. Bry. Eur. iii., t. 270, 271.

Rusthall Common; in fruit abundantly at Westerham in 1842; *Jenner Tunbr.*

"*Bryum hypnoides*" recorded in Fl. Met. from Blackheath and Dartford Heath should be this species, since the moss, under this name in Ray. Syn. iii., p. 97, includes both this species and *R. lanuginosum*, Brid., the latter of which is not likely to have been found in Kent. Possibly the name in Fl. Met. may have been incorrectly copied for *Bryum trichoides, erectis capitulis*, &c. (*Tortula intermedia*, Brid.), which is recorded in Ray. Syn., l.c., as occurring on Blackheath and Dartford Heath.

Orthotrichaceæ.

Tribe I.—*Zygodonteæ.*

ZYGODON VIRIDISSIMUS, *Brid.*

On old trees; common; the fructification rare. March. Bry. Eur. iii., t. 206.

Abbey Wood; Chelsfield; Otford; Shoreham; Eynsford; Sevenoaks; Ightham; Maidstone; Hothfield; Dover; Hythe.

Tribe II.—*Orthotricheæ.*

ULOTA BRUCHII, *Brid.* *Polytrichum capsulis oblongo-rotundis, calyptris pilosissimis*, Ray Syn. iii., p. 91; *Orthotrichum Bruchii*, Brid. (Wils.; Hobk.).

On trees in woods. July, August. Bry. Eur. iii., t. 227.

In a wood a little beyond Westerham in Kent; *Dr. Doering, Ray Syn. l.c.*

Toy's Hill and Seal Chart, near Sevenoaks; *Howse!* King's Wood, near Maidstone; Dunton Green; Challock's Wood, near Wye; Brenchley; Lydd Beach; Thornden Wood, near Canterbury.

U. CRISPA, *Brid.* *Orthotrichum crispum*, Hedw. (Wils.; Hobk.).
On trees in woods, &c.; common. June, July. Bry. Eur. iii., t. 228.
Dunton Green; *George!* Ightham; Toy's Hill, near Sevenoaks; King's Wood; Ashover Wood, near Penshurst; on dwarf thorn bushes, Lydd Beach; Challocks Wood, near Wye; Brenchley.
U. Bruchii may be distinguished from this species by its darker, less crisped leaves, and by its longer lid and longer fruitstalk.
U. PHYLLANTHA, Brid. *Orthotrichum phyllanthum*, Br. & Sch. (Wils.; Hobk.).
On trees and on rocks near the sea; always barren. Rather rare. Bry. Eur. iii., t. 223.
Postling, on a thorn bush in a hedge in a damp meadow.
This species closely resembles *U. crispa*, but differs in the apex of the leaf being furnished with gemmæ and in having only a single row of diaphanous cells, which are situated at the reflexed margin of the leaf.
ORTHOTRICHUM CUPULATUM, *Hoffm.*
On rocks and walls, chiefly of limestone; rare. April, May. Bry. Eur. iii., t. 209.
On tiles of a shed by a chalkpit between Shoreham and Morant's Court Hill.; *Fl. T. Jenner.*
O. SAXATILE. *Brid.* *O. anomalum*, Hedw. (Wils.; Berk.; Hobk.).
On rocks and walls chiefly of limestone; frequent. Spring. Bry. Eur. iii., t. 210.
On tiles of a shed between Shoreham and Morant's Court Hill; Riverhead, Sevenoaks; *Jenner Tunbr.* Boughton Monchelsea; Maidstone; Hythe.
O. TENELLUM, *Bruch.*
On trunks of trees; not common. May, June. Bry. Eur. iii., t. 51.
Ashover Wood, Penshurst; in fruit abundantly.
May be known from the other small species by its long cylindrical capsule, which usually exceeds the leaves by rather more than half its length, and from small forms of *P. affine* by its short lid and by the leaves not being papillose.
O. AFFINE, *Schrad.*
On trunks of trees, old palings, &c.; common. June, July. Bry. Eur. iii., t. 216.
Dunton Green; *George!* Southborough; *Fawcett!* Maidstone; Penshurst; Thornden Wood, near Canterbury; Lydd Beach.
Known from *O. tenellum* and *O. pumilum* by the long beak of the capsule and papillose leaves, loosely imbricated when dry.
O. STRAMINEUM, *Hornsch.*
On trees in parks; rather rare. June, July. Bry. Eur. iii., t. 218.
On beech trees in Knole Park, Sevenoaks; *Jenner Tunbr. Suppl.*
Distinguished from most of the other small species by its hairy vaginula and pale calyptra.
O. DIAPHANUM, *Schrad.*
On trees and on palings, &c.; common. April. Bry. Eur. iii., t. 219.

Greenhithe; *George!* Farningham; *Howse!* Boxley Hill, Maidstone; Hothfield; Wye.

O. LEIOCARPUM, *Br. & Sch.*

On trees; common. February, March. Bry. Eur. iii., t. 230.

Penshurst; Ightham; Shoreham; Halstead; Hothfield; Thornden Wood, near Canterbury.

O. LYELLII, *Hook.*

On trees in hilly districts; frequent. July. The fructification not common. Bry. Eur. iii., t. 221.

Tunbridge Wells; Penshurst Park, in fruit; Thornden Wood, near Canterbury; King's Wood, near Maidstone, and Toy's Hill, near Sevenoaks, in fruit; Ightham, in fruit; Postling.

O. SPRUCEI, *Mont.*

On branches of alders occasionally submerged, and on roots of trees by river-sides. May, June. Bry. Eur. iii., t. 214.

On elms, and on alders by the River Medway, near Ashover Wood; abundantly.

Splachnaceæ.

SPLACHNUM AMPULLACEUM, *L.* *Bryum erectis gigartinis capitulis, foliis serpilli pellucidis acutis*, Ray Syn. iii., p. 93.

On the dung of horses and of other animals in bogs on upland heaths; rare. May, June. Bry. Eur. iii., t. 293.

West Wickham, plentifully; *Sherard, Ray Syn. l.c.*

Keston Common; *N. Ward; George!* 1875.

Funariaceæ.

Tribe I.—*Ephemereæ.*

EPHEMERELLA RECURVIFOLIA, *Br. & Sch.* *Phascum recurvifolium*, Dicks. (Wils.; Hobk.).

On the ground in fallow fields; rare. November, December. Bry. Eur. i., t. 2.

Wrotham, in a field near the large chalk-pit, November, 1875.

To the naked eye this species looks like a dark green stain upon the ground. It is usually found in the furrows or where the ground is rather damp. It is easily distinguished from the next species by the excurrent nerve of the leaf.

EPHEMERUM SERRATUM, *Müll.* *Phascum serratum*, Schreb. (Wils.; Hobk.).

In sandy fields which have lain fallow for a year or more. Spring and autumn. Bry. Eur. i., t. 1.

Tunbridge Wells Common; *Jenner Tunbr.* Forest Hill, in a grass-plot in a garden near the station; *George!* Ide Hill, near Sevenoaks, abundantly.

PHYSCOMITRELLA PATENS, *Schr.* *Phascum patens*, Hedw. (Wils.; Hobk.).

On clay banks by streams, and on the mud thrown up on the side of ditches. September. Bry. Eur. i., t. 3.

In some clay-pits about three-quarters of a mile from Edenbridge Station by the roadside towards Westerham; *Jenner Tunbr.* On a ditch bank by the roadside near Pembury Green, abundantly.

Tribe II.—*Funarieæ.*

PHYSCOMITRIUM PYRIFORME, *Br. & Sch.*

On moist banks and sides of ditches. April. Bry. Eur. iii., t. 299.

Sturry Marshes, near Canterbury ; Otford.

[*P. fasciculare*, Br. & Sch., which differs from the last species in having a nearly flat lid, a smaller capsule, and narrower leaves, should be looked for in fallow clay fields in April. *P. ericetorum*, De Not., is likely to occur on damp shady banks on heaths in upland districts. It may be known from the two above-mentioned species by its margined leaves.]

FUNARIA HYGROMETRICA, *Hedw.*

On sandy places, in quarries, and on heaths where the herbage has been burnt; common. May, November. Bry. Eur. iii., t. 305.

Blackheath ; *Fl. Met.*, p. 48. Charlton Quarry, abundant ; Otford ; Hayes Common, near Bromley, &c.

[*F. calcarea*, Wahl., which has a smaller capsule, a straight (not curved) fruitstalk, and leaves with long serrate points, should be looked for on limestone walls in greensand districts in spring.]

Bryaceæ.

LEPTOBRYUM PYRIFORME, *Wils.* *Bryum aureum*, Schreb. (Forster Tonbr.).

On sandstone rocks and walls; not common. May, June. Bry. Eur. iv., 355.

In the lane going to Speldhurst from Rusthall Common and on the Rocks ; *Forster Tonbr.* Tunbridge Wells Common ; *Jenner Tunbr.* Wall of Chiddingstone Churchyard ; sand cave near Wrotham Station, barren ; on sandstone rockwork in the garden at Redleaf, near Penshurst, and on the haha wall in Penshurst Park.

[*Orthodontium gracile*, which grows on the High Rocks in Sussex, within a few yards of the stream separating Kent and Sussex, should be looked for on the perpendicular sides of damp sand rocks in Kent.]

LAMPROPHYLLUM NUTANS, *Lind.* *Bryum nutans*, Schreb. (Wils. ; Hobk.) ; *Webera nutans*, Hedw. (Berk.)

In sandy woods and on sandy and peaty heaths ; frequent. May. Bry. Eur. iv., t. 347.

On mountainous heaths about Woolwich ; *Dillenius, B G.* Tonbridge Wells Common ; *Forster Tonbr.* Bostol Wood ; Paul's Cray Common.

L. ANNOTINUM, *Lindb.* *Bryum annotinum*, Hedw. (Wils. ; Hobk.) ; *Webera annotina*, Schwaeg. (Berk.)

In cultivated fields and damp sandy places, always barren ; not common. May, June. Bry. Eur. iv., t. 352.

In a small sand-pit near Penshurst.

Known from the following by the pale hue of the leaves and the narrower cells of the leaves ; from *L. albicans*, which it more closely resembles, by the smaller size and the leaves not being secund.

L. CARNEUM, *Lindb.* *Bryum carneum*, L. (Wils.; Hobk.); *Webera carnea*, Schpr. (Berk.).

On damp soil at the bottom of hedgebanks, and on damp rubble in quarries, frequent; not common in fructification. March, April. Bry. Eur. iv, t. 353.

Blackheath; *Fl. Met.* Between Lee and Eltham; *Huds. Fl. Ang.* In fructification abundantly in the large chalk quarry near Greenhithe Station.

L. ALBICANS, *Lindb.* *Bryum Wahlenbergii*, Schwaegr. (Wils.; Hobk.); *Webera albicans*, Schpr. (Berk.).

On wet banks and dripping places, in isolated tufts; not observed in fructification. May. Bry. Eur. iv., t. 354.

Ightham Common. Seal, near Sevenoaks. Tunbridge; *Howse!* On a bank near Keston Common.

Bryum ventricosum, M.B. 30, E.B. 2272, which according to Wilson is a synonym for *L. albicans*, is recorded in Jenner Tunbr. from "Tunbridge Wells Common and elsewhere;" but from the time of maturity of fruit therein mentioned, viz., July, it appears probable that *Bryum bimum* is the species referred to, that being the *Bryum ventricosum* of Dickson and in part of Hooker and Taylor, although not of E.B. 2272.

(*To be continued.*)

SHORT NOTES.

SCOTTISH ALPINE FLORA.—Some botanical adventures in the Ben Lawers district, detailed by Prof. Balfour in vol. xi. of the "Transactions of the Edinburgh Botanical Society," led to the formation at Killin, on August 10th, 1870, of the "Scottish Naturalists' Alpine Club," "to consist of naturalists in the habit of visiting alpine districts in Scotland for the practical study of science, and who have proved themselves to be pleasant *compagnons de voyage*. No one to be admitted who has not these qualities, and who has not proved that he has ascended on foot to the summits of three Scottish mountains, not less than 3000 feet above the level of the sea." In 1872 the explorations of the Club were devoted to Clova, visiting Glen Dole, Glen Fee, Little Gilrannoch, and the two most interesting lochs of the district. In 1873 they investigated Cham-a-creag and Bheinean, in Perthshire; in 1874 the celebrated Lochnagar, Canlochan, Loch Callater, &c., in Braemar; in 1875 Ben Laoigh and other hills in Perthshire and Argyle, convenient to their head-quarters at Tyndrum; and last year they resolved upon the mighty Ben Nevis. Of this excursion Mr. Sadler, the secretary of the Club, read an account at a recent meeting of the Edinburgh Botanical Society, and the following is a short abstract of his observations, so far as they related to Flowering Plants and Ferns. On July 24th the party of thirteen, including the guide, left Fort William, taking the usual way of ascent, the distance to the summit being estimated at five miles. From 1000 feet the course of the stream that issues from the lake situated at 1840 feet elevation was followed, the vegetation being of the ordinary subalpine and

moorland description of the Scottish Highlands. In this lake they gathered *Isoetes lacustris**, *Subularia aquatica**, and *Lobelia Dortmanna**. From it the ascent was continued without anything particular to note to 2700 feet, where there is a rocky gorge through which passes a stream that has its origin in the highest spring (3363 feet) on the mountain. The gorge is only 100 yards or so in length, but yielded the best plants seen on this side of the mountain, *e.g.*, *Epilobium alsinifolium*, and *alpinum*, *Polypodium alpestre*, *Sagina saxatilis**, *Sedum Rhodiola*, *Armeria maritima*, *Cerastium trigynum*, *Cerastium latifolium*, var. *Smithii*, and a very curious small form of *Saxifraga stellaris* growing in interlaced tufts, something like *Montia fontana*. Between the upper end of the ravine and the spring referred to, *Sibbaldia*, *Aira alpina*, *Veronica humifusa*, *Salix herbacea*, the var. *pubescens* of *Cerastium alpinum*, and var. *compactum* of *C. latifolium* (very fine) were gathered. At about 3500 feet soil suitable for any phanerogamous vegetation almost entirely disappears, and the acclivity, bestrewn with blocks of granite and porphyry, yields nothing but a few Mosses and Lichens. At 3900 feet the stupendous precipices are reached, and along the edge of these the party travelled to the summit, where they arrived in a thick mist, amidst torrents of sleet and rain borne along by a piercingly cold fierce wind. The culminating point is 4406 feet above sea-level, and is surmounted by a cairn 6 feet high. Close to this cairn a solitary specimen of *Saxifraga stellaris* was picked, consequently the highest ranging flowering plant in Great Britain. On the following day the precipices (and snow corries) on the N.E. side of the mountain were visited; they rise from a base of about 2000 feet altitude, and majestically ascend in seeming perpendicular or overhanging face for 1500 feet. Amongst the plants gathered were *Vaccinium uliginosum*, *Cornus suecica*, *Carex atrata**, *C. rigida* (very large), *Potentilla alpestris**, *Saxifraga oppositifolia*, *rivularis* and *nivalis**, *Cherleria**, *Salix reticulata**, *Saussurea*, *Veronica saxatilis** (in one spot) and *humifusa*, *Juncus castaneus**, *Carex pulla*, *Draba incana**, *Juncus triglumis**, &c. On the 26th the party separated, one section going to Strontian in Argyleshire (in that portion of the county included by Mr. Watson in Westerness). Th ascent of Ben Resipole yielded but barren result. Near to Loch Sunart, however, the following species were procured: *Malaxis*,* *Pinguicula lusitanica*, *Utricularia minor**, *Osmunda regalis**, *Lythrum Salicaria**, *Drosera anglica*, *Sedum anglicum*, *Nephrodium æmulum**, *Jasione montana**. I have marked with an asterisk such of the plants mentioned above as are additions to the "Topographical Botany" list for Mr. Watson's division 97. If a complete catalogue of all seen during the excursion had been made doubtless it would have added a large number of the commoner species to our published information respecting Westerness.—F. M. Webb.

Arenaria norvegica, *Gunn.*—In the last edition of his "Manual" Prof. Babington enters *Arenaria norvegica* definitely as an Orkney species, whereas in ed. vi. no reference is made to it as such. This change may be based upon a discovery of which I have not heard, but in case it rests in any way upon the statement in the Exchange Club

Report for 1858, and mentioned by Syme in E. B., ed. iii., that the plant was "found in the Orkneys by Sir R. Murchison and Mr. Peach," I had better put on record, whilst Mr. Peach is with us, that I have the authority of that gentleman for saying it was in Shetland and in Unst only it was picked when he and Sir Roderick were in company, and he never even knew Orkney was credited with it until I pointed out to him the bracketed note in "Topog. Bot."—F. M. Webb.

Extracts and Abstracts.

GEOGRAPHICAL STATISTICS OF THE EXTRA-BRITISH EUROPEAN FLORA.

By Thomas Comber.

(*Continued from* p. 26.)

Degrees of dispersion.—To each species is assigned a figure representing its degree of dispersion, according to the group in which it is placed by the analysis. The figures,* ranging from 1 to 2, 1 correspond with those employed in the investigation respecting British plants, and the averages of them, by means of which the present inquiry is conducted, are, as in the former paper, carried to two places of decimals.

II. Dispersion with regard to latitude.—The wider range, east and west, of plants which reach high Northern latitudes is shown in quite as marked a degree by Continental as by British plants, as is evident from the following averages:—

Species.		Average.
23	Arctic	
101	Arctic-alpine	
63	Northern	
99	Northern-montane	
247	Temperate	
533	reaching high N. latitude	7·24

* The degrees of dispersion have been fixed as follows:—

As regards range within Europe itself and Africa. Arctic and Northern zones (restricted), in which the range both of longitude and latitude is small, 1. Southern, Alpine, and Montane zones, and Temperate plants confined to S. latitudes, if found in only one longitudinal division of the Continent, 1; if in two, 2; if in all the three divisions, 3. Arctic-alpine, Northern-montane, and Temperate plants, which have a greater range of latitude, if confined to one longitudinal division, 2; if to two divisions, 3; if found in all three divisions, 4.

For range into Asia 1, 2, or 3 is added to the European figure, according as the plant reaches W., Central, or E. Asia. Asiatic plants therefore range from 2 to 7.

Species common to Europe and America, belonging to zones with but little range of latitude, 8; to Arctic-alpine, Northern-montane, and Temperate zones, 9.

Universal division, if confined to N. hemisphere, zones with small range of latitude, 10; the three zones with greater range of latitude, 11; if extending to the S. hemisphere, 12.

404	Alpine	
760	Montane	
168	Temperate (S.L.)	
4752	Southern	
6084	not extending N. of cereal line . . .	2·23
6617	total of Continental flora	2·63

It will be seen that the general average of the whole Continental flora is considerably under that of British plants, indeed less than half, the figures being 2·63 against 7·00. This arises mainly from two causes—1. That most of the widely-diffused European species occur in this country, and having thus appeared in the British lists, are excluded from the present ones. 2. That a larger proportion of Continental plants is confined to S. latitudes. The latter influence can be avoided by comparing with the British average that of only those zones which are represented in Britain. These contain 1126 species, and average 5·50; while the remainder, comprising the two lower sections of the Southern zone, Alpine, Montane, and Temperate plants confined to S. latitudes, number 5491 species, and average 2·04.

III. DISPERSION AS AFFECTED BY STATION.—*Aquatic and palustral plants.*—So generally dispersed are aquatic plants, that most European species are found in Britain; and only a few fail to reach us from the Continent, the most marked being *Elatine Alsinastrum* and *Trapa natans*. The proportion of palustral plants is also much smaller in the Continental flora. The average degree of dispersion of each is considerably greater than that of terrestrial plants, thus fully confirming the British figures.

Species.		Average.
19	aquatic	5·00
198	palustral or semi-aquatic . . .	4·21
6400	terrestrial	2·58

Maritime plants.—Prof. Alph. De Candolle's calculations (Geog. Bot., vol. 1, p. 522) attributed to maritime and salt-loving plants a wider range than that of other plants. Our British lists gave a different result, the maritime average being somewhat less than that of other plants; and from the following averages, in which the salt-loving species so common on the Eastern steppes are ranked as maritime, it will be seen that this is also the case in the Continental flora:—

Species.		Average.
315	maritime or salt-loving	2·53
6302	other plants	2·64

Calcareous plants.—In some of the works on Continental botany stations are given very vaguely, or omitted altogether; and I have consequently not been able to separate as a distinct group plants confined to sandy soils, or found only in woods and copses; but a predilection for a calcareous soil is more generally recorded, and Continental plants evincing it are found to have a lower degree of dispersion than other plants.

Species.	Average.
160 calcareous	2·08
6457 non-calcareous	2·65

Parasites.—The parasitic plants contained in the British lists were so few in number, that but little dependence could be placed on the averages obtained from them. In the Continental flora we have a considerably larger proportion, and they are found to have, like the British species, a low degree of dispersion. Species which are supposed to be semi-parasitic, but are probably never restricted in their choice of victim-plants (*Rhinantheæ* and *Thesium*), give, on the contrary, a high average; and this agrees with the former result. The figures are:—

Species.	Average.
68 complete parasites	2·23
62 semi-parasites	3·50
6487 non-parasitic	2·59

IV. DISPERSION IN RELATION TO HABIT.—*Trees and shrubs.*—British trees were found to "range rather more widely than herbaceous plants over land, rather less so over sea." This remark applies with equal force to Continental trees, of which only 3 (or 3½ per cent.) cross the Atlantic, against 4¼ per cent. of other plants; while 20 (or 22½ per cent.) are confined to Europe alone, against 63½ per cent. of other plants. But whilst in the case of British plants, almost half of which (41 per cent.) cross the Atlantic, the smaller range of trees over sea reduced their degree of dispersion *below* that of herbs; in the case of the Continental flora, of which only a small fraction of the members (4¼ per cent.) reach America, their wider range over land exerts the stronger influence, and raises the average of trees *above* that of herbs. The following averages show that Continental shrubs have a lower degree of dispersion than herbs, as was the case with British:—

Species.	Average.
89 trees	3·73
803 shrubs	2·36
5725 herbs	2·65

Creeping rhizomes or stolons.—The mean dispersion of "repent" plants, as compared with others, corresponds with that calculated from the British lists:—

Species.	Average.
231 repent	4·41
6386 non-repent	2·57

(*To be continued.*)

THE CASUARINÆ.

Recherches sur les Casuarina, et en particulier sur ceux de la Nouvelle-Caledonie. Par M. JULES POISSON. ("Nouvelles Archives du Muséum," vol. x., 1876.)—In germination the cotyledons are epigean, and are provided with stomata scattered over the surfaces, while the ordinary adnate leaf-scales (phyllichnia) have their stomata arranged

in rows. A pair of triangular primordial leaves destitute of stomata alternates with the cotyledons, after which verticillate phyllichnia are developed. Each plantule bears three buds, the two lateral ones superposed to the cotyledons. In the male flower of some species the posterior bracteole is much enlarged and almost surrounds the anther; while, on the other hand, the anterior bracteole is greatly reduced and closely applied to the anther, which may be the reason this organ is occasionally overlooked. M. Poisson holds that the outer envelope of the female flower should be called "scale" (not bract), and the inner envelopes "bracts" (not bracteoles). The development of the ovule is as follows. While the stigma is still fresh no trace of an ovule is to be seen, but merely a small cellular papilla at the base of the ovarian cavity. In *C. equisetifolia*, *quadrivalvis* and *nodiflora*, after withering of the style, one finds two ovular papillæ projecting from the base of the ovary, the interval between which soon rises up, and the two ovules, now provided with their envelopes, are directed a little obliquely from the anterior side of the ovary. Meanwhile the placenta becomes raised and directed away from the posterior side of the ovary, after which it is drawn towards the opposite side; along this it rises, bearing at its summit the two ovules, one of which is destined to abortion; by its elongation the placenta has become filiform. At length the summit of the fertilised ovule arrives at the top of the ovarian cavity, with which it appears to contract a slight adhesion, which is doubtless the reason why it has been taken to be pendulous. Moreover in *C. angulata*, a new species from New Caledonia, sometimes three or four ovules are found in each ovary.

The classification proposed is essentially the modification of Miquel's arrangement adopted by Mr. Bentham, with the addition of a second division to include for the most part several New Caledonian types. Fully drawn out the genus stands as below.

Division 1. *Casuarinæ cylindricæ seu cryptostomæ.*

Ramification verticillate. Branches cylindric, deeply grooved between the phyllichnia, the grooves bearing a number of simple or branched, long or short hairs, the function of which is to protect the stomates, which are arranged on the sides of the grooves. Male inflorescence simple; female axillary.

Sect. I. *Leiopitys*, Bth. Bracts smooth and membranous.
„ II. *Trachypitys*, Bth. Bracts rugose.
„ III. *Acanthopitys*, Miq. Bracts spiny.

Division 2. *Casuarinæ tetragonæ seu gymnostomæ.*

Ramification alternate or subverticillate. Branches tetragonous, the grooves reduced to shallow furrows, which are hairless. Stomates either on the two sides of the furrows or in isolated lines all round the stem. Male inflorescence compound: female terminal.

M. Poisson discusses the affinities of the genus, and comes to the conclusion that it stands in an intermediate position between *Gnetaceæ* and *Myriceæ*. The plates, being by Faguet, are of course perfect. We can only regret that the services of the artist were not enlisted in the representation of the microscopical structure of the several conditions

of the ovary and its parts. Great interest attends the smallest structural points in solitary outlying forms, and scarcely any genus is so isolated as the subject of M. Poisson's memoir.

On Morchella bispora.

Zur Kenntniss der Morchella bispora. Von Prof. N. Sorokine. ('Botanische Zeitung," Sept., 1876.)—*Morchella bispora*, Sorok. at first sight differs outwardly but little from *M. esculenta* and *M. bohemica*, from both of which it is readily distinguished by its 2-spored asci. The height of the stem varies between 10 ctm. and almost nothing; its surface is often provided with a soft white clothing composed of small hairs which are detached by the slightest touch, and on longitudinal sections large and small cavities are seen in it. The underside of the pileus is furnished with white stellate points which consist of bundles of colourless hairs. The entire Fungus is formed of broad, branched, irregularly interlaced cells, lying closely together at the periphery of the stem, but less closely in the central parts; the peripheral cells are usually short and the central ones long. Specially noticeable are cells with dark protoplasmic contents, which it is suggested may be foreshadowings of a laticiferous system. The contents of the ordinary cells consist of transparent vacuolar protoplasm. The hymenial layer is composed of asci and branched many-celled paraphyses. During development the cells destined to become asci at first differ scarcely at all from the other cells of the pileus, but afterwards they become broader and longer, and fill with granular protoplasm which soon becomes differentiated into a finely-granular protoplasm occupying the upper part of the young ascus, and a tenacious shining epiplasm found in its lower portion. A nucleus is next seen in the protoplasm, the early disappearance of which is apparently not followed by the formation of nuclei of the second and third order. Two at first scarcely perceptible but soon clearly defined elliptical bodies are then found in the protoplasm; these are the young spores, during the formation of which the protoplasm dwindles away, but the epiplasm remains for a longer time filling up the basal portion of the ascus. The ripe spores are narrowly elliptical but slightly curved in form; their length is ·078 mm., and breadth ·017 mm.; the contents are clear with a yellowish spot in the centre; under the influence of iodine the spore-membrane takes a yellow colour, and the contents contract and become dark-yellow. The number of spores in the ascus is very constant, for out of the several hundred examined only one had a single spore and two had three spores.

M. bispora is found in the Russian governments of Kazan and Kursk, but it grows in Western Europe also, if M. Sorokine is right in referring to this species a *Morchella* with 2-spored asci found in France, and originally referred by Desmazières to *M. bohemica*, British mycologists would do well to look out for it.

Structure of the testa in Cucurbitaceæ.

Ueber die Anatomie und Entwickelungsgeschichte der Samenschalen einiger Cucurbitaceen. Von Dr. I. F. Fickel. ("Botanische Zeitung,"

Nov. and Dec., 1876.)—After fertilisation of the ovule the outer (epidermal) layer of cells of the outer integument undergoes division, and gives origin to two underlying cell-zones. In the full-grown seed of most genera the epidermal cells of the testa are provided with bands of thickening, which either extend wholly or partially across the cell, and are then either simple or branched, or else run up and down the cell-wall, the opposite thickenings being sometimes connected by cross-bands. The cell-zone immediately below the epidermis consists either of one layer or several layers, which, in the latter case, are more numerous at the margins of the seed than elsewhere. The succeeding zone is generally several-layered, and the cells being usually very thick-walled, it takes in most instances the principal share both in protection of the embryo and in the due adjustment of the supply of water during germination. The layers of cells lying under this zone and produced from the outer integument, as well as all those derived from the inner integument, remain thin-walled and are pressed together by the growing embryo.

HAYNALDIA, nov. gen. *Lobeliacearum*, auctore AUGUSTO KANITZ.—Flos diplochlamydeus, zygomorphus, opisthodromus resupinatus, hermaphroditus, cyclicus, cyclis ex indole pentameris, gynæciali vero depauperato. Calyx basi ovario connatus, pentamerus subglobosus, oblongus, sepalis 3 superioribus, 2 inferioribus (in flore resupinato) parum inæqualibus, supra basin connatis ceterum lineari-lanceolatis, subulatis. Corolla disci margini inserta, sympetala, pentamera, calycem seperans rarius eo brevior, bilabiata, labium superius (in flore resupinato) petalis duobus æqualibus longitudinaliter fissum, inferius tripetalum æquale vel petalo medio paullo longiore, petalorum partes liberæ apicales subincumbentes vel patentes. Androecium pentamerum a petalis supra plus minus remotum, epigynum. Stamina 5 monadelpha styla cingentia. Filamenta basi libera inferne dilatata juxta totam longitudinem in tubum connata, duo inferiora paullo breviora. Antheræ oblongæ, erectæ, dithecæ, birimosæ, rima longitudinaliter dehiscentes, connatæ, duo inferiores paullo breviores, vertice barbatæ vel penicillatæ. Pollinis granula discreta, flava, ellipsoidea, levia, trisulca. Gynæcium dimerum, syncarpicum, carpidia 2. Pistillum turbinatum stamina superans. Ovarium inferum, subglobosum, biloculare. Placentæ carnosulæ. Ovula plurima, placentis undique affixa, integumentis 2. anatropa. Stylus apicalis, simplex, filiformis, sub anthesi inclusus, demum ex androecio exserto. Stigmata duo mediana, lobis rotundatis, glabris, subtus pilorum collectivorum annulo. Capsula infera vel semisupera, bilocularis, conico-rostrata, apice valvis 2 loculicide dehiscens. Semina plurima parva, lentiformia, ala membranacea cincta. Embryon orthotropus in endospermio ex cellulis cellularum divisione ortis compositi, axi, ejusdem fere longitudine.

Herbæ elatæ, 1-4 metrales, perennes, paludam Brasiliæ incolæ, caulibus simplicibus fistulosis, inferne nudes, foliis usque 40 cm. longis alternis bracteis magnis linearibus vel latioribus, racemis a 30 cm. usque fere metralibus, petalis cæruleis, cyanis vel pallide-violaceis.

Genus sat naturale quatuor speciebus *Lobeliarum* brasiliensibus jam antea nominatis, quarum tamen haud una satis cognita erat, fundatum. (De *Lobelia uranocoma*, Cham. (Haynaldia uranocana, *Kan.*), *L. thapsoidea*, Schott (H. thapsoidea, *Kan*), *L. exaltata*, Pohl (H. exaltata, *Kan.*), cf. DC. Prodr. vii., p. 379-380, n. 125, 126, 127. Quarta, *L. organensis*, Gardn. in Hook. Lond. Journ. Bot. iv., 128, ex Walp. Rep. vi., 375, sec. descriptionem fragmentariam certe est *Haynaldia*; an bona species?)

Haynaldia differt a plurimis *Lobeliaceis* seminibus alatis, a *Lobelia* etiam bracteis magnis et e *Tupa* insuper corolla bilabiata.

Dedico hoc genus viro excellentissimo ac reverendissimo Ludovico Haynald SS. Th.D. Archiepisc. Coloc. et Bács., scientiæ amabilis cultori felici, botanicorum fautori, auctoris patrono optimo.—(From the "Magyar Növéntanilapok," 1877, p. 3.)

Canbya, *Parry*, is a new genus of *Papaveraceæ* discovered by Dr. E. Palmer, in 1876, in S. E. California, and is dedicated to W. M. Canby, of Wilmington, Delaware. It is very small, forming tufts of an inch in height. A full description and a good figure are given in Dr. A. Gray's Botanical Contributions in the 12th volume of the "Proceedings of the American Academy" (December, 1876). It is closely related to *Arctomecon*, which is also here well figured, and shown to be a good genus. Both have very persistent petals, a singular anomaly in this Order. The following is the diagnosis:—

Canbya, *Parry*, nov. gen. *Papaveracearum*.—Sepala 3, caduca. Petala 6 obovata, diu persistens demum scariosa, capsulam obvolventia. Stamina 6-9: filamenta antheris oblongo-linearibus breviora. Ovarium subglobosum: placentæ 3, nerviformes, multiovulatæ: stylus nullus; stigmata 3, oblongo-linearia, reflexo-divaricata, ovario adpressa, *placentis superposita*, facie superiore (interiore) prorsus papillosa: capsula ovoidea, membranacea, a vertice ad basin trivalvis, valvis placentas filiformes cum stigmatibus persistentes nudentibus. Semina plurima, elongato-oblonga, parum arcuata; testa lævissima nitida; raphe haud prominula, nuda. Embryo prope basin albuminis minimus cylindraceus.—Herbula annua, glabra parum uncinalis; fo iis alternis linearibus integerrimis subcarnosis cum ramis brevissimis cæspitoso-confertissimis; scapis perplurimis filiformibus (semipollicaribus) unifloris; petalis læte albis.

Notices of Books.

Text-book of Structural and Physiological Botany. By Otto W. Thomé. Translated and edited by Alfred W. Bennett. Illustrated with about 600 woodcuts and a coloured map. Longmans, 1877 (pp. 480).

This small volume forms one of a series of "Text-books of Science, adapted for the use of artisans and students in public and science schools;" and the original book, by the Professor of Botany in the Cologne

School of Science, is stated to be "the recognised text-book in use in the technical schools of Germany." The object of the English editor has been specially to make his translation useful to candidates for the University of London and the South Kensington examinations, though it is not of course intended to supersede practical work with the dissecting-knife and microscope.

To the numerous class of students in this country for w hom Sachs's "Text-book" is too advanced, the present more elementary work is well adapted. It covers a wider range than any of the existing English manuals, including an outl ine of vegetable palæontology and the geographical distribution of plants, and is altogether more on a level with existing knowledge in the more strictly botanical portions. Indeed, this may be regarded in some measure as an abstract of Sachs's great work, an abridgment of which in an English dress is really wanted. The arrangement is that of most English text-boosks; it commences with the consideration of the cell, passes naturally on to the tissues; then follows the organography of plants, and after this their life-processes. The chapter on special morphology and classification is the most extended, and gives an excellent conden sedaccount of the various groups; to meet the requirements of English students, the section on the classification of Phanerogams has had to be entirely rewritten. Fossil and geographical botany conclude the volume; the latter is mainly a *resumé* of Grisebach's "Vegetation der Erde."

The translation is a successful one, and the additions in brackets, which have been made by the translator, add to the completeness of the book. For instance, fuller accounts of the *Characeæ*, of *Torula*, &c., are given, and numerous annotations and footno tes occur through out the volume.

The woodcuts are numerous enough, but not always very satisfactory; many are old acquaintances; of the new ones, some are rather rough and hard. We have a very full index, in which are references not only to the page, but also to the figures where each term is illustrated. The book is very well and clearly printed. On the whole, though it would not be difficult to pick a few small holes, this text-book is a real gain to students here, and, it may be hoped, will supplant some of the old manuals which still continue to teach the Botany of the last generation.

H. T.

Proceedings of Societies.

LINNEAN SOCIETY, *December* 21, 1876.—Prof. Allman, F.R.S., President, in the chair.—Mr. Thomas Christy and Mr. Robert Drane were duly elected Fellows of the Society. The following papers were read:—"Note on the uses of a commercial Cane, termed 'Whangee,'" by J. R. Jackson. This jointed Bamboo is imported in quantity, and supposed to be from China. It is a species of *Phyllostachys*, probably *P. nigra*. Pale-coloured as introduced for trading purposes, English-grown specimens of the plant are black. The author believes bleaching is had recourse to, and other means to render them straight.

Specimens were exhibited.—"Some morphological notes on certain species of *Thunbergia*," by Marcus M. Hartog. The author observes that the plurality of flowers and buds in each axil and the origin of the calyx are of special interest in the genus *Thunbergia*. He has made these the subject of investigation, by studying their development and examining specimens by microscopical sections and reagents. In *T. laurifolia* in the earlier stages the first signs of axillary buds are inside the sixth or eighth pair of bracts, the prominences soon forming two elevations a little above the base. These become pedicels and young bractlets, and inside by repetition sister-buds arise. The flowers then are axillary buds formed in succession from the axis outwards, and are as independent as if they had arisen side by side. The calyx is at first a fine dentate ring, the posterior tooth being larger than all the rest. The calycal teeth may or may not persist till closure of the ovary, according to the different species.

January 18, 1877.—Prof. Allman, President, in the chair.—Dr. W. Millar Ord, Mr. T. Routledge, and Mr. S. D. Titmas were elected Fellows. Mr. R. Irwin Lynch exhibited a pot of growing Wheat sprung from grain left in Polaris Bay, Smith's Sound, 81° 38′ N. Lat., by the ill-fated American Expedition. Capt. Sir G. Nares, on his return from the recent Arctic Expedition, in a letter to Dr. Hooker mentions that the grain in question lay exposed to all the rigorous and intense cold of that far northern clime through the years from 1872 to 1876. Nevertheless, when the sample brought home was sown at Kew, about 64 per cent. of the grains were capable of germination. Two Peas were also found to be in good condition. It is likewise worthy of remark that among the Wheat a single grain of Maize was observed, and this representative of a tropical vegetation retained its vitality in spite of the low temperature, and was among the seeds that germinated. This observation as to the retention of the vitality of seeds is valuable as an authenticated record that the severest Arctic frost, even long continued, does not wholly deprive the embryo of the above Cereals of its vitality.

February 1.—George Bentham, F.R.S., V.P., in the chair.—Messrs. George Boulger, Alfred S. Heath, and William Meller, were elected Fellows.—Mr. Stevens exhibited examples of some exceedingly large Oak leaves gathered near Croydon, and also specimens of double-flowered Anemones. The following papers were read:—"On the aspects of the vegetation of Rodriguez," by I. Bailey Balfour, M.B., who accompanied as botanist the Transit of Venus Expedition to that island in 1874. The flora is essentially insular, as might be expected, but it is dry and temperate rather than humid and tropical in character. It displays a Mascarene type, with affinities, however, to the Polynesian and American regions, although an Asiatic flora predominates. Many common and wide-spread plants have been introduced, and the ancient flora of the island may be, from various or doubtful causes, in great part destroyed; in this respect, therefore, recalling to mind the insular flora of St. Helena, well known to have been entirely changed in its superficial facies by fire, introduction of domestic animals, and human agency. A somewhat remarkable and well-marked feature in the present flora of Rodriguez is the heteromorphism exhibited in the leaves of many of the plants, especially

among the shrubs. It appears that young plants produce leaves of a lower stage of development than adult, and as the individual increases in age the leaves successively produced approach more nearly the mature form, until at a certain stage of growth only typical leaves are found. Once this stage is reached, all the leaves produced on the branches are of the adult form. But should any adventitious shoots develope from the base of the trunk, or appear on the stem anywhere below its first branching, these always have the juvenile and not the adult form of leaf. This heterophylly as a whole is in degree and kind somewhat variable, though among species pretty uniform in its variations.—"Enumeration of the Fungi collected during the Expedition of H.M.S. *Challenger*, 1874-1875," by the Rev. M. J. Berkeley (3rd notice). Several new species are described, and a list of Fungi amounting to nearly 200 shortly commented on.—"Tropical Ferns collected by Prof. Steere in the years 1870-1875," by H. M. Harrington, M.A., Assistant Professor of Botany, University of Michigan, United States. Prof. Steere during the years mentioned journeyed across the Continent of South America, going up the Amazon River and towards Peru. Thence he proceeded to Formosa, and latterly sojourned for a long time in the various islands of the Philippine Archipelago. On islands of the latter, but seldom trod by foreigners, he obtained a number of new forms. These have now been described, after having undergone the supervision of Mr. Baker, of Kew. Among other specimens new to science may be noted *Hymenophyllum Thuidium*, *H. fraterum*, *Davallia philippensis*, *Lomaria Areolis*, *Asplenium Steerei*, *Nephrodium Luersseni*, *N. Bakeri*, *N. subpedatum*, *Polypodium Skenkii*, *P. craterisorum*, *P. hammotiosorum*, *P. Steerei*, &c.

February 15.—Prof. Allman, F.R.S., President, in the chair.—Messrs. William Burns, E. T. Gardner, J. W. S. Meiklejohn, Prof. W. W. Harrington, of Michigan, U.S., the Rev. John Stobbs, and Sir Charles W. Strickland, Bart., were elected Fellows.—Mr. Arthur Lister exhibited under the microscope an example of the plasmodium of one of the *Myxomycetes*. The following papers were read:—"On the rootstock of *Marattia fraxinea*, Sm.," by John Buchanan, of the Geological Survey, New Zealand. The *Marattia*, he states, is chiefly found in the northern parts of New Zealand, where the Maories use it as food, but do not cultivate it systematically. They say that when it is smashed up and the pieces thrown on the ground, it springs up freely, and thus it is presumed to have increased. At Wellington, when transplanted, it grows luxuriantly, especially when placed in rich damp soil. The author described its mode of growth. Its rate of growth is unusually slow, hence may be the reason of its scarcity, its consumption as an article of food keeping pace with its production.—"On the Algæ collected by Dr. I. B. Balfour at the Island of Rodriguez," by Professor Dickie. The short time devoted to the collection of marine forms during the stay of the members of the Venus-Transit Expedition, 1874, at Rodriguez, may partly account for paucity of numbers of Algæ obtained. Of 52 species and varieties 39 were marine. None call for special attention, most being of world-wide distribution.

March 1.—Prof. Allman, F.R.S., President, in the chair.—Robert Gillies, Herbert Goss, Albert Gunther, F.R.S., and Matthew Moggridge were elected Fellows, and M. C. Cooke was elected an Associate of the society.—Mr. W. P. Hiern exhibited the embryo of *Diospyros Embryopteris*, Pers., upon the fruit and seed of which species Gærtner founded his genus *Embryopteris* (see p. 100).—Dr. Maxwell Masters brought before the meeting a series of specimens illustrative of what are commonly known as "burrs" or "witch knots." The examples exhibited were collected by Mr. Webster, gardener to the Duke of Richmond and Gordon. Some of these productions were illustrations of dimorphism or bud-variation, and attributable perhaps to the reappearance of ancestral characteristics usually latent, or to the disjunction of parental forms usually amalgamated. Others owed their origin to some injury to the terminal bud, and the subsequent hypertrophy of the branches and the excessive development of adventitious buds. The injury was frequently the result of insect puncture, as in the case of the Birch, the "burrs" on which had been lately discovered by Miss E. Omerod to be produced by a species of *Phytoptus*; at other times it was the result of parasitic Fungi, or of injury consequent on frost, the wounds caused by birds, the action of wind, &c.—"On the Flora of Marocco (*Spicilegium Floræ Maroccanæ*)," by John Ball, F.R.S. The author gave the more readable portion of his paper, and a hasty summary of the technical and botanical results. By a sketch map he pointed out the peculiar physical features of the territory penetrated at several points by Dr. Hooker, Mr. G. Maw, and himself in 1871; and he mentioned how that Marocco, though within but a few days' journey from London, was in many respects a *terra incognita* to Europeans, and the Flora necessarily very imperfectly known. Mr. Ball gave a historical account of what little had been done by earlier botanists—Zanoni, 1675; Spotswood, 1673; Broussonet, 1790-9; (the collections of the latter were distributed to several European botanists, and here and there incidentally noticed by them); and Cavanilles, of Madrid, who temporarily secured to Spain a fair share of honour by his papers in the scarce periodical, "Ann. d. Ciencias Nat." M. Cosson had lately been working at Broussonet's material deposited in the Montpellier Museum. Schousboe, some time Danish Consul at Mogador, commenced in 1801, but left unfinished, a Flora of Marocco. Jackson in his account of the empire of Marocco (1809) has noticed the curious Cactoid Euphorbias. P. Barker Webb, in a short visit (1827) to Tangier and Tetuan, discovered a new genus of Cruciferæ. Between 1840-70 several Frenchmen touched at various points, and the "Pugillus Plantarum" of M. Boissier contains merely a germ of future work. The Rev. R. T. Lowe contributed to the Linnean Society (1860) a list of plants observed by him at Mogador. But notwithstanding the preceding labourers, a mere tithe of the flora has yet been worked out, and almost nothing satisfactorily. Mr. Ball in 1851 attempted to reach the higher summits of the lesser Atlas, but the disturbed condition of the district obliged him to desist. M. Balansa was likewise repulsed in 1867 (though fortunate in collecting a number of new and remarkable species); but Mr. G. Maw was more successful in 1869. Messrs. Hooker, Maw, and Ball's routes in 1871 were then pointed out, and some technical data given concerning

plants collected. In the summary of botanical results Mr. Ball showed that the proportion of *Compositæ*, *Leguminosæ*, and *Liliaceæ* is unusually large; whereas *Gramineæ* and *Ranunculaceæ* are exceptionally small. Of *Rosaceæ* there are 16, of *Saxifrageæ* 5, of *Primulaceæ* 7, of *Gentianeæ* 8, and of *Cyperaceæ* only 28 species, thus bearing out the fact that only but a small proportion of these Natural orders are present in Marocco, which Orders otherwise are so characteristic of the mountainous countries of the north temperate regions. According to Mr. Ball's researches, it would seem as if five temperate floras co-existed in the territory in question, to wit:—(1) Mediterranean in general; (2) Peninsular (Spain and Portugal); (3) Desert; (4) African Mountain flora; (5) Macaronesian; to which he thinks might be added (6) Cosmopolite, or widely spread European species. The total number of Phanerogamous plants now described or given in a list in his paper are 1618 species, and among these many novelties,* as might be anticipated.—"On the *Liliaceæ*, *Iridaceæ*, *Hypoxidaceæ*, and *Hæmodoraceæ* of Dr. Welwitsch's Angolan Herbarium," by J. G. Baker. By the courtesy of the executors, the author had been enabled to examine these Orders, and to describe the numerous new species, which form a very large proportion of the whole series. The greater part are members of Tropical African or Cape Genera already known, but there are three new ones here described. In the running survey of his paper the author specially alluded to *Dipcadi comosum*, *Acrospira asphodeloides*, *Dasystachys campanulata*, *D. colubrina*, *Xerophyta capillaris*, and *Lapeyrousia odoratissima* as of considerable interest in several aspects. —Dr. Trimen remarked that though Angola is used to mean the whole of the Portuguese possessions in West Tropical Africa, yet for phyto-geographical purposes it is important to discriminate the very distinct regions contained in its boundaries. Dr. Welwitsch's explorations revealed in the highland district of Huilla, in Benguella, a very interestiug semi-temperate flora, analogous to that of Abyssinia, abounding in novelties, and abundantly different to the purely tropical flora of Angola proper.—Mr. Hiern questioned whether the *Albuca angolensis* of Welwitsch's "Apontamentos," a species from Golungo alto, in Angola proper, was certainly the same as that from Huilla which Mr. Baker had described under the same name in the "Refugium Botanicum."—"Contributions to the Lichenographia of New Zealand," by Charles Knight, Esq., F.L.S., Auditor-General of New Zealand. This was a purely technical paper.

March 15.—Prof. Allman, President, in the chair.—The Rev. A. Gardner Smith and Mr. Alexander Young Stewart were elected Fellows of the Society.—There was exhibited by the Superintendent of the Apothecaries' Hall a sample of a bark forwarded from New Zealand, and said to possess powerful medicinal properties. To what species it belongs is doubtful, though referred with probability to a species of *Leptospermum*. The rough analysis made shows it to be wanting in any alkaloid principle, but to contain tannin and abundance of mucilaginous substances. This bark is being further

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* Mr. Ball has published descriptions of the more interesting of these in the volumes of this Journal for 1873 and 1875.

investigated at the Laboratory of the Hall. A sample of what was named Persian "Manna" was also exhibited by the same gentleman. This is a greenish, opaque, unctuous, but tolerably solid mass, amongst which many fragments of leaves are evident.—The Secretary read a paper "On the Poisoned Spears and Arrows of the Samoa Islanders," by the Rev. Thos. Powell. The author obtained his information from the son of a native chief. According to the latter's account, the weapons (which are pointed with human bones) are dipped into a mixture composed of a milky exudation from several different trees, among others *Calophyllum Inophyllum*, to which is added a material procured from wasps' nests, besides putrid matter from the Sea Cucumber *(Holothuria)*. The weapons are then smoked in a sort of kiln, and afterwards inserted into the dried flower-stalk of *Tacca pinnatifida* to prevent bad effects from moisture, and finally wrapped in bundles ready for use.—In the discussion which followed, Mr. Busk expressed an opinion, based on his recent examination of an arrow alleged to be poisoned, and on the symptoms of reported cases, that the substances used are of no effect, and that the deaths following wounds by such weapons are the ordinary cases of traumatic tetanus so frequently met with in hot climates. Two gentlemen who had visited the Samoa Islands stated that they had been informed that weapons were poisoned by insertion of the points for some time in a putrid human body, though afterwards coated with some vegetable resinous matter.

Botanical News.

ARTICLES IN JOURNALS.—FEBRUARY, 1877.

Botanische Zeitung.—H. Dingler, "*Lathræa rhodopea*, nov. sp."—J. B. Jack, "Hepaticæ Europææ" (contd.).—J. Pancic, "A new Conifer in the East Alps."

Flora.—S. Schulzer, "Mycological notes" (tab. 2).—A Batalin, "Mechanism of movements in insect-eating plants."—J. E. Duby, "Diagnosis muscorum novorum" (*Henonia*, gen. nov. Japan).—J. Müller, "Lichens of Texas."—Obituary notice of F. W. Schultz.—F. Buchenau, "Dehiscence of capsule in German species of *Juncus*" (tab. 3).

Hedwigia.—F. Körnicke, "Mycological notes" (*Hamaspora*, gen. nov. *Uredinearum*).

Oesterr. Bot. Zeitschr.—C. Mikosch, "On the multiplication of chlorophyll-corpuscles by division."—E. v. Halaczy, "*Achillea Jabornegii*" (*Clavennæ* × *moschata*).—E. Hackel, "Diagnoses Graminum novorum" (Spain and Portugal).—C. Haussknecht, "Remarks on some Fumarias."—J. Freyn, "Austro-Hungarian plants" (contd.).—F. Hazslinszky, "On *Septosporium curvatum*, A.Br."—A. Kerner, "Distribution of Hungarian plants" (contd.).—S Schulzer v. Muggenburg, "Mycological notes."—J. Kugy, "Botanical excursion in mountains of S. Croatia."—F. Antoine, "Botany of Vienna Exhibition" (contd.).

Magyar Növénytanilapok.—L. Haynald, "On what geological formation does the Chestnut grow in Hungary?"—P. Ascherson, "On the botanical affinity of *Zea Mays*."—J. Csato, "Recent additions to flora of Magy-enyed."

Bot. Notiser.—N. J. Scheutz, "Review of Swedish and Norwegian Roses."—E. Warming, "On *Rhizophora Mangle*, L." (tab. 1).

Ann. des Sc. Nat. (vol. iii., pt. 4-6).—E. Bescherelle, "Bryological Flora of the French Antilles" (concluded).—Durin, "On the transformation of crystallisable sugar into cellulose-products."—J. Vesque, "Anatomy of *Goodenia ovata*" (t. 19).—P. P. Dehérain and J. Vesque, "Researches on the respiration of roots."—M. N. Geleznow, "Researches on the quantity and distribution of water in the stem of woody plants."—J. Vesque, "On the structure of wood."—Bureau and Poisson, "On a rock of vegetable origin."—V. Knop and H. Dworzak, "Chemico-physiological researches on the nutrition of plants."

New Books.—C. Luerssen, "Grundzüge der Botanik" (Leipzig Haessel. 5s.).—Duchartre, "Elemens de Botanique." Edit. 2. Part 2. (Paris. Baillière.)

M. Cas. de Candolle has an interesting paper on the twining of tendrils in the "Archives de Sciences de la Bibliothèque Universelle" of Geneva, for January.

The "Verhandlungen" of the Heidelberg Nat. Hist. Society (Band i., Heft 3) contains papers by Pfitzer, on the rate of movement of water in plants; by L. Koch, on the development of the seeds of *Orobanche*; and by Wolkoff, on the absorption of light in solutions of chlorophyll.

A fourth portion of Baron von Mueller's "Descriptive notes on Papuan plants" consists of determination of D'Albertis' and Goldie's collections on the Fly River, in the south-east of the island. New species of *Hibiscus*, *Bauhinia*, *Mucuna*, *Combretum*, *Begonia*, *Randia*, *Cycas*, and *Dicksonia* are described.

We note with pleasure the appearance of a modest little "Natural History Journal, conducted by the Societies in Friends' Schools." Judging from the first two numbers, the publication is well calculated to stimulate and foster scientific tastes among the pupils. Mr. J. G. Baker offers prizes "open to all girls and boys at Friends' schools for observations on the fertilisation of forty common flowers, and for the best set of drawings of the leaves and capsules of twenty Mosses."

A third volume of the "Flora of Tropical Africa" will shortly appear, containing the Orders from *Umbelliferæ* to *Campanulaceæ*, the bulk consisting of the great groups *Rubiaceæ* and *Compositæ*.

Joseph Carson, M.D., died at Philadelphia on December 30th, 1876, at the age of sixty-eight. He was Professor of Materia Medica in that University, and an eminent pharmacologist. A notice will be found in the Bulletin of the Torrey Botanical Club for January.

The large Herbarium of the late R. J. Shuttleworth, of Basle, has been acquired by the British Museum.

Original Articles.

SOME REMARKS ON THE SYNONYMY OF PALMS OF THE AMAZON VALLEY.

By J. W. H. Trail, M.A., M.B., F.L.S.

In addition to the comments on the synonymy made in my paper on new species and varieties of Palms collected in the Amazon Valley by myself, I think it may be of some use to state the conclusions to which I have come from an examination of Spruce's types in the Kew Herbarium, and from examining authentic specimens of some of the species described by Dr. Rodriguez in his "Enumeratio Palmarum novarum," &c. As will be seen, my conclusions differ a good deal from those of Dr. Spruce and of Dr. Rodriguez.

Trjbe Lepidocaryinæ.

Mauritia linnophilla, Barb. Rod. (l.c., p. 18) = *M. aculeata*, H.B.K. nec Mart.

Lepidocaryum enneaphyllum, Barb. Rod. (l.c., p. 19), and *Lepidocaryum* 6-*partitum*, Trail & Barb. Rod. (l.c., p. 18), are both simply varieties (and not even constant varieties) of *Mauritia* (*Lepidocaryum*) *tenuis*, Mart. The name *L.* 6-*partitum* was given by myself provisionally for convenience of reference till I could examine the question of its specific value, but was not intended for publication. *M. tenuis*, Mart., is a most variable species, alike in number of laciniæ in the leaves, and in form and size of fruit, so much so that on the same plant leaves may be found with all numbers from 2 to 10 or even to 14 or more laciniæ, while on the same spadix (still more in the same clump of plants) the fruits often vary considerably in form and in size, as well as in form, convexity, ciliation, and colour of scales. Hence no reliance can be placed on these characters as distinguishing species. On examining the types of *Mauritia* (*Lepidocaryum*) *quadripartitum*, Spruce, of *M. Casiquiariensis*, Spruce, and of *M. Guainiensis*, Spruce, I came to the conclusion that they are all forms of *M. tenuis*, Mart. The fruits of *M. Guainiensis*, Spruce, from which his descriptions were made, are evidently only half-grown, and entirely resemble fruits of *M. quadripartita*, Spruce, at the same age. The synonymy of *M. tenuis* is therefore as follows:—

Mauritia (*Lepidocaryum*) *tenuis*, Mart. = *M. quadripartita*, Spruce (Palm. Amazonicæ, pp. 172-3); *M. Casiquiariensis*, Spruce (l.c., pp. 173-4); *M. Guainiensis*, Spruce (pp. 173-4); *Lepidocaryum enneaphyllum*, Barb. Rod. (l.c., p. 19), and *L.* 6-*partitum*, Barb. Rod. (l.c., p. 19).

Tribe Arecineæ.

Genus *Geonoma*.—Of the 9 species of *Geonoma* named by Dr. Rodriguez (l.c., pp. 9-12), the descriptions given are not in any case

sufficient to permit of their identification with any approach to certainty, and in the case of some it is hardly possible even to guess at their affinities.

Of the species described by Dr. Spruce (in Journal of the Linn. Soc., vol. xi.), *G. Paraensis*, Spruce = *G. multiflora*, Mart. *G. discolor*, Spruce = *G. multiflora*, Mart., var. ; it differs from *G. multiflora* only in the lower surface of the pinnæ being paler than the upper. *G. Negrensis*, Spruce, differs from *G. multiflora* only in the narrower pinnæ and in the simply-branched spadix, and cannot be regarded as more than a subspecies of the latter. *G. hexasticha*, Spruce, differs from *G. Negrensis*, Spruce, only in the rather more numerous branches of the spadix, in the more distinctly hexastichous arrangement of the alveoli (in *G. Negrensis* 5-6-stichous), and in the andrœceum of the ♀ flower being 3-crenate at the mouth instead of 6-lobed. The last character is the only one of any importance, and even it, as I have shown elsewhere, is not to be relied on as of more than subspecific value. My conclusion therefore is that *Geonoma multiflora*, Mart.= *G. Paraense*, Spruce (l.c., p. 120), and includes var. *discolor*, Spruce (sp.) (l.c., p. 117), subsp. *Negrensis*, Spruce (sp.) (l.c., p. 120), subsp. *hexasticha*, Spruce (sp.) (l.c., pp. 116-7). *G. multiflora*, Mart., itself comes very near to *Gynestum maximum*, Poiteau (Mém. du Musée d'Hist. Nat. ix., 331, t. i.).

G. macrospatha, Spruce (l.c., p. 114), is simply a variety of *G. acutiflora*, Mart. = *Gynestum baculiferum*, Poiteau. Specimens collected by myself (Trail hb. Palm. 34, 50, 124, 180, &c.) at numerous localities show an unbroken chain of forms connecting the two extreme forms. Poiteau's name for this species has the priority of Martius's, and is accompanied by a good figure and a good description; hence it must take precedence, so that the synonymy becomes—*Geonoma baculifera* (*Gynestum baculiferum*, Poit.) = *Geonoma acutiflora*, Mart., and includes *G. macrospatha*, Spruce (sp.).

Genus *Iriartea*, Ruiz e Pavon.—*I.* (*Socratea*) *exorhiza*, Mart. (Hist. Palm. ii., p. 36), and *I.* (*Socratea*) *Orbigniana*, Mart. (Palmet. Orb., p. 15, t. xx., B.), should, I believe, be regarded as local forms of one species, the differentiating points being the entire pinnæ, 5-6 spathes, and rather larger nuclei of the fruits in the former, as against the pinnæ cleft into 8-10 (3-13) laciniæ, the 4-5 spathes, and the smaller nuclei in the latter. The former is found on the coast or submaritime districts, the latter along the rivers of Bolivia and of the province of Amazonas. In the intermediate districts I have collected specimens from Obydos, from the Rio Purus, from the Rio Jutahi, &c. (Trail hb. Palm., 117, &c.), which show a complete transition from the one to the other, becoming more like *Orbigniana* farther up river.

I. philonotia, Barb. Rod. (l.c., p. 13), is simply the intermediate form from Obydos, with some of the pinnæ divided into two or three laciniæ, the lowest lacinia as usual being broad, the others narrow.

I. Spruciana, Barb. Rod. (l.c., pp. 13-14) = *I. pruriens*, Spruce MSS. (l.c., pp. 135-6) = *I.* (*Iriartella*) *setigera*, Mart. Dr. Spruce (l.c., p. 136), after a full description of a Palm which he rightly identifies with *I. setigera*, Mart., remarks, "When I first found it and com-

pared it with Martius's account of *I. setigera*, as abbreviated in Kunth's 'Enumeratio' (iii., 195), it seemed to me certainly distinct, and I called it in my MSS. 'Iriartea pruriens.' Martius says of his *I. setigera*, 'spathæ 4-5' (I found but 3, although one or more might have fallen away from my fruiting specimen), and 'bacca elliptica,' but nothing about its being gibbous and widened upwards, as I have always seen it. But the greatest discrepancy is in the height of the stem, which I have never seen above 20 feet, whereas Martius gives it as 'sub-50-pedalis.'" The above discrepancies are to be explained as follows. Dr. Spruce's conjecture as to the loss of one or more spathes from his specimen is almost certainly correct, at least I always found 4 or 5 spathes in specimens examined by myself. The fruit, though described by Martius as elliptical, is figured by him (Hist. Palm., vol. ii., t. xxxvii.) as described by Dr. Spruce. Lastly, the height of the stem is correctly given by Martius as 15 feet, but has been wrongly transcribed in Kunth's "Enumeratio" (l.c.) as 50 feet. Moreover the negative evidence of identity is very strong, viz., that in the forests of the Rio Negro, so far as is yet known, there is only the one species that could possibly be indicated by Martius.

Dr. Rodriguez (l.c , p. 14) says, "Inductus varietate florum fructusque, quam nunc inter hanc speciem et *I. setigeram*, Martii, et jam antea animadverteram, quum primum legeram opus Sprucii de *Palmis Amazonicis*, statim existimavi novam esse speciem eamque dedicavi Dr. Sprucio, qui primus characteres, quibus differt ab specie præclari botanici germani notavit." Further comment is needless.

Genus *Euterpe*, Mart.—Dr. Rodriguez (l.c., pp. 15-16) has introduced some confusion into this genus by giving the name *E. Caatinga* to a new species, altering the name of *E. Caatinga*, Wallace, into *E. mollissima* on the following grounds:—"Clarissimi Dr. Spruce opera *Palmæ Amazonicæ* altera speciem descripta et quæ una crescit cum hac (i.e. *E. Caatinga*, B. Rod. nec Wallace) sed majorem altitudinem consequitur, flexuosa et prædita vagina *albo-viridi-carnosa* et minores fructus gignit. Haud melioribus usus indiciis ipsam *Acay Caatinga* appellavit, secutus auctoritatem Wallacii, qui primus hanc speciem (nuncupatam *Uassahy chumbo* vel *mirim*) vulgavit. Nomen vulgare speciei, hic nunc descriptæ, vindicare conatus sum *quia pro specifico existimandum est volo, ne quis pro scientifico nomem vulgare alterius speciei præbeat.* Itaque ad speciem Sprucii significandam, cujus descriptio p. 137, vol. xi., commentar. Societ. Linn. invenitur velim usurpari nomem *mollissima* quo nota est in MS. herbarii Musæi Chioviæ."

I have italicised the principle on which the change is made by Dr. Rodriguez. Few botanists will feel disposed to give their adherence to it so far as to consent to changing the nomenclature of species already correctly figured and described, however excellent it may be as a rule of action in giving names to new species. In this instance, however, I can bear witness to *E. Caatinga*, Wallace, being called sometimes *Assai Caatinga* by the natives. *E. Caatinga*, Barb. Rod., is so briefly described that besides the rather smaller size and rather larger fruits the only other features that distinguish it from *E. Caatinga*, Wallace, are the "vagina aurantiaca" and "spadice, pedunculo aurantiaco, nonnullo tomento fusco."

Tribe Cocoinæ.

Bactris armata, Barb. Rod. (l.c., p. 27, no. 5).—"Stipiti mediocri; petiolo ad basim invaginante, aculeis subflavis ad extremitatem nigris vestito, supra vaginam paulo aculeato; frondibus indivisis, cuneatis, bifidis, ad margines sinuatis, ciliatis, ad paginam inferiorem velutinis. Flores fructusque non vidi."

The above description applies in every point to specimens of *B. chætospatha*, Mart., collected by myself at Ayraõ, on the Rio Negro, and on the Barrs. de Cararaucu, on the Amazon (Trail hb. Palm. 37 & 87); I am therefore disposed to regard *B. armata*, Barb. Rod., as a synonym of *B. chætospatha*, Mart.

B. palustris, Barb. Rod (l.c., p. 36, no. 25).—Having in my collection (Trail hb. Palm. 14) specimens of this Palm named by Dr. Rodriguez himself, I have been able to determine it to be *B. bidentula*, Spruce (l.c., p. 151).

As to the species of *Bactris* described by Dr. Rodriguez additional to those remarked on in this or in my former paper, I can offer no remarks tending to elucidate the species in any way.

In so difficult a genus as *Bactris* descriptions of new species to be of value should be clear and full, and should be drawn up only from specimens bearing spadix and spathes, *at least*, as well as leaves; if provided with flowers and fruit, so much the better, as these are absolutely necessary to determine with precision the position in the genus of a new species. Neglect of these rules simply tends to add to the difficulties of the subject, and to introduce still more confusion where there is already too much.

TWO NEW ORCHIDS FROM SAMOA COLLECTED BY THE REV. S. J. WHITMEE.

By H. G. Reichenbach, fil.

Dendrobium dactylodes; affine *D. biflorо*, Sw., ultra pedale, vaginis nervosis, rugosis, laminis oblongo-ligulatis apice bilobis ($\frac{1}{2}''$ supra basin latis), inflorescentiis bifloris, basi vaginis scariosis obtusis brevibus involutis, mento obtusangulo modico, sepalo summo petalisque binervibus, sepalis lateralibus lineari-triangulis, labello oblongo antice trifido, laciniis lateralibus triangulis abbreviatis lacinia media porrecta triangulo-acuminata, nunc revoluta, utrinque basi lobulata carina una alta a basi labelli in basin laciniæ mediæ paullo undulata lacinia media dimidio superiori clavis obsita, androclinio tridentato.

This is a much larger and stronger plant than the old *D. biflorum*, Sw. The lip of the genuine species has a much longer nail, the three laciniæ are all acute, the middle one much the longest, there is no undulate keel on the middle line nor papillar zone on the base of the middle lacinia, which surface has, however, some short hairs. I have seen the type in the British Museum. The species has lately been confounded with the Javanese *D. acuminatissimum* by Swedish authorities.

Etœria Whitmeei; vultu *Goodyeræ proceræ*, Hook., ultra spithamæa, foliorum vaginis basi amplis dein in petiolos lineares attenuatis, laminis cuneato-ligulatis acuminatis (ad 8), pedunculo valido glandipilo, vaginis ligulatis acuminatis paullo distantibus sub racemo aggregatis, racemo cylindraceo acuto, bracteis tri-uninerviis, flores æquantibus seu superantibus, floribus "posticis," i.e., positione originaria permanentibus, sepalis ovatis, petalis ligulatis basi inferiori obtusangulis, labello calceolari cum columnæ basi connata, antice obtusangulo trifido, lacinia antica parva triangula, columna utrinque antica lamella appendiculata.

A rather curious plant, with the general habit of the well-known *Goodyera procera*, Hook., but with very dense ligulate acuminate leaves and a rather short spike. It is probably very near *Etœria polyphylla*, Rchb. fil.

I have seen several good specimens of both the above species at Kew Herbarium, whence I have been kindly favoured with duplicates.

NOTE ON THE VEGETATION OF CROMER, NORFOLK.

By Henry Trimen, M.B., F.L.S.

While staying at Cromer, on the north coast of Norfolk, during the past August, 1876, I marked in a "London Catalogue" the species I met with in a small radius—not more than two miles—from the village. A few notes on the results will perhaps be interesting to botanists of southern and western England who may be unfamiliar with the peculiarities of East Anglian vegetation, which are here presented in a strongly marked manner. In the first place, the paucity of species is striking; the whole number marked was 289—a singularly small number*—and of these the great bulk are the universally diffused European and British species. Notwithstanding this, the vegetation of the eastern counties generally gives the impression of luxuriance, and, as has been frequently observed, is much more showy than that of the Atlantic side of England. The leading plants which by their combination in masses cause this floral brilliancy are, in August, *Reseda lutea*, *Silene inflata* and *S. vespertina*, *Knautia arvensis*, *Cichorium Intybus*, *Carduus nutans*, *Centaurea Scabiosa*, *Senecio Jacobæa*, *Linaria vulgaris*, *Lycopsis arvensis*, *Echium vulgare*, and some others. These are typical and characteristic species about Cromer.

Besides them the following less conspicuous plants are important factors of the vegetation, being all abundant in the uncultivated portions of the low sandy cliffs or in waste ground:—*Sisymbrium Sophia*, *Silene conica*, *Arenaria serpyllifolia* (with var. *leptoclados*), *Cerastium arvense*, *Erodium cicutarium*, *Geranium pusillum*, *Ononis arvensis*, *Medicago sylvestris*, *Trifolium arvense*, *T. procumbens*, *Sedum*

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* Prof. Babington, who was also staying in Cromer at the same time, has, during that and several previous visits, raised the whole number of species seen to as many as 429, but his range extends considerably over two miles.

acre (on the bare sands), *Daucus Carota*, *Galium verum*, *Artemisia vulgaris*, *Teucrium Scorodonia*, *Plantago maritima*, *Rumex crispus*, *R. Acetosella*, *Carex arenaria*, *Phleum pratense* (the well-marked var. *P. nodosum*, L. (*P. præcox*, Jord.)), *Sclerochloa loliacea*. These two lists give a good general notion of the main character of the flora, which is certainly an unfamiliar one to the eyes of a London botanist. Some of the species are even rarities, and call for further remark. *Silene conica* grows in abundance on sandy banks to the west of Cromer, and *Medicago sylvestris* in similar places, in one part forming the bulk of the herbage, and especially affecting the edges of the cliffs; it appears to be undoubtedly native here, as probably in others of the sandy tracts of Norfolk and Suffolk. The *Phleum*, which appears to be *P. nodosum* in its most extreme and striking form, is a leading plant on the sandy cliffs.

Of other noteworthy species marked; *Papaver hybridum* occurred in but one spot; *Potentilla argentea* is frequent; and so, in the hedges, are *Sedum Telephium* (*purpurascens*) and *Tanacetum vulgare*, both probably native plants here; *Hypochæris glabra* (the form called *H. Balbisii*, Lois.) was abundant in some Potato-fields (it was noticed near Cromer by Dawson Turner before 1805); both *Filago minima* and *Erigeron acris* are pretty common; the scarce *Orobanche cærulea* occurs in several spots along the east cliff, growing in patches near the edge, on *Achillea Millefolium*; *Hyoscyamus niger* and *Cynoglossum officinale* occur here and there; and *Epipactis palustris* was observed in one damp place by the roadside near Felbrigg. (It is very abundant at Beeston Bog, beyond my bounds.)

The flora seemed more remarkable for wants than occurrences, many of the commonest southern species being apparently absent or very scarce; but my stay was too short to enable me to speak decidedly as to particular species. Aquatic and marsh plants were unusually scarce; scarcely a *Juncus* or a *Potamogeton* were met with, till a little bit of common was detected near E. Runton, which yielded also *Polygala depressa*, *Stellaria uliginosa*, *Œnanthe fistulosa*, *Pedicularis sylvatica*, *Anagallis tenella*, and *Scirpus setaceus*, none of which were seen by me elsewhere.

Still more marked is the want of maritime shore plants. The cliffs are constantly giving way to the ever-gaining sea and the wash of rain, and thus no footing is afforded for plants at their foot. *Triticum junceum* is the only seashore plant at all abundant, but this grows to a great luxuriance. *T. pungens* is rare, and *T. acutum* I did not observe. Occasional precarious tufts of *Cakile*, *Honkeneja*, *Salsola Kali*, and *Atriplex Babingtonii* are the only other shore plants noted as occurring.

There is little calling for critical remark. An elegant small upright form of *Rumex conglomeratus* at East Runton had a striking first-sight resemblance to the western *R. rupestris*. The panicle is elongated and tapering, and scarcely branched, save at the base, where there are a few ascending branches; it may be called var. *subsimplex*. The common *Cerastium* of the sandy cliffs is a somewhat puzzling plant, with completely the habit of *C. tetrandrum*, but the bracts have so wide a scarious margin as perhaps to warrant the name *C. semidecandrum*, which has been given to the specimens by some good botanists.

Another plant worth notice is a *Sagina* found growing in dry sandy ground in Felbrigg Park. This, which has much the habit of *S. subulata*, must be referred to *S. procumbens*, from which it differs in its stiff tufted habit, tough scarcely herbaceous branches, and the sepals erect in fruit.

The fact that Cromer plants are almost unnoticed in the "Flora of Norfolk" (1866) may afford an excuse for the above notes. In the more recent list of the plants of the county in the Norfolk and Norwich Naturalists' Society's Transactions, the author, Mr. Geldart, who has himself examined this district, gives occasional Cromer localities, and I am glad to be able to here confirm their accuracy.

SHORT NOTES.

Luzula campestris, *L.*, in Kensington Gardens.—I was pleased to see a plant of this in flower to-day (April 20th) in Kensington Gardens, about midway between the Palace and Victoria Road southwards. Some dozen unflowered roots were scattered about. There was no indication of the turf having been recently imported. No doubt specimens are at present procurable in Hyde Park. In London especially such an early-flowerer is likely to be overlooked.—J. L. Warren.

Arenaria norvegica (p. 114.)—My authority for the Orkney station for this plant is Syme's E. Bot. A Mr. Heddle is named there as an additional authority. Dr. Boswell can no doubt explain the point more fully: I cannot.—C. C. Babington.

Extracts and Abstracts.

NEW SPECIES OF PHANEROGAMOUS PLANTS PUBLISHED IN PERIODICALS IN GREAT BRITAIN DURING THE YEAR 1876.

The following list contains the new genera and species of Flowering Plants published in the following periodicals during 1876:—"Botanical Magazine," "Gardeners' Chronicle," "Icones Plantarum," "Journal of Botany," and "Journal of the Linnean Society." No new species of Phanerogams were published during the year in the "Transactions of the Linnean Society," as vol. i. (n.s.), part 4, though bearing the date 1876, was not published till January, 1877. The 2nd part of vol. ii. of Bentham and Hooker's "Genera Plantarum" appeared in May, and contains many new genera.

Several other species, considered as new but not named, are described or noticed in Prof. Oliver's Enumeration of Cameron's

Tanganyika plants (Journ. Linn. Soc. xv., pp. 90-92), Mr. C. B. Clarke's Botanic Notes from Darjeeling to Tonglo (Journ. Linn. Soc. xv., pp. 116-159), and Mr. Hemsley's Notes on Chinese Plants (Journ. Bot., 205-210).

ACIDANTHERA BRACHYSTACHYS, *Baker* (Irideæ).—Cape. (Journ. Bot., p. 338.)

A. BREVICOLLIS, *Baker*.—S. Africa. (Journ. Bot., p. 339.)

A. GRAMINIFOLIA, *Baker*.—Cape. (Journ. Bot., p. 338.)

A. HUTTONI, *Baker*.—S. Africa. (Journ. Bot., p. 339).

A. PLATYPETALA, *Baker*.—Natal. (Journ. Bot., p. 339.)

ADENOPHORA ISABELLÆ, *Hemsl.* (Campanulaceæ).—China. (Journ. Bot., p. 207.)

ADINANDRA PHLEBOPHYLLA, *Hance* (Ternstroemiaceæ).—Cambodia. (Journ. Bot., p. 240.)

AFZELIA CAMBODIENSIS, *Hance* (Leguminosæ).—Cambodia. (Journ. Bot., p. 258.)

AGANISEA CÆRULEA, *Rchb. f.* (Orchideæ).—Brazil. (Gard. Chron. ii., p. 226.)

AGAVE BOTTERI, *Baker* (Amaryllideæ). — Mexico. (Bot. Mag., t. 6248.)

AGELÆA GLABRIFOLIA, *Hance* (Connaraceæ).—Cambodia. (Journ. Bot., p. 257.)

AINSLIÆA WALKERI, *Hook. f.* (Compositæ).—Hong-Kong. (Bot. Mag., t. 6225.)

ALBUCA JUNCIFOLIA, *Baker* (Liliaceæ).—Cape Colony. (Gard. Chron. i., p. 534.)

AMBLYOCALYX BECCARII, *Benth.* (Apocyneæ).—Borneo, Beccari 1628. (Ic. Plant., t. 1179).

AMBLYSTIGMA HYPOLEUCUM, *Benth.* (Asclepiadaeæ).—Bolivia. (Ic. Plant., t. 1188.)

A. PEDUNCULARE, *Benth.*—Bolivia, Mandon 353. (Ic. Plant. xii., p. 77.)

ANGRÆCUM BRACTEOSUM, *Balf. f. & S. Moore*.—Bourbon. (Journ. Bot., p. 293.)

ANODISCUS PERUVIANUS, *Benth.* (Gesneraceæ).—Peru, Spruce 4400. (Ic. Plant., t. 1199.)

ANOMATHECA ANGOLENSIS, *Baker* (Irideæ).—Angola. (Journ. Bot., p. 337.)

A. GRANDIFLORA, *Baker*.—W. Trop. Africa. (Journ. Bot., p. 337.)

ANTHERICUM AITONI, *Baker* (Liliaceæ).—Cape. (Journ. Linn. Soc. xv., p. 294.)

A. ANCEPS, *Baker*.—S. Africa. (Journ. Linn. Soc. xv., p. 305.)

A. ANGULICAULE, *Baker*.—S. Africa. (Journ. Linn. Soc. xv., p. 305.)

A. BRASILIENSE, *Baker*.—Brazil, Gardner 3471, 2319. (Journ. Linn. Soc. xv., p. 306.)

A. BREVICAULE, *Baker*.—Cape. (Journ. Linn. Soc. xv., p. 298.)

A. CAMERONI, *Baker*.—Trop. Africa. (Journ. Linn. Soc. xv., p. 96 and 314.)

A. CARNOSUM, *Baker*.—Natal. (Journ. Linn. Soc. xv., p. 296.)

A. CAULESCENS, *Baker*.—Guinea, Barter 1515. (Journ. Linn. Soc. xv., p. 303.)

A. Cooperi, *Baker*.—S. Africa, Cooper 1004, 3302. (Journ. Linn. Soc. xv., p. 305.)

A. drimiopsis, *Baker*.—E. Trop. Africa. (Journ. Linn. Soc. xv., p. 301.)

A. fasciculatum, *Baker*.—Cape. (Journ. Linn. Soc. xv., p. 316.)

A. gramineum, *Baker*.—Madagascar. (Journ. Linn. Soc. xv., p. 302.)

A. involucratum, *Baker*.—Cape, Drège 2681. (Journ. Linn. Soc. xv., p. 311.)

A. longistylum, *Baker*.—Cape, Cooper 3295. (Journ. Linn. Soc. xv., p. 305.)

A. Macowani, *Baker*.—Cape. (Journ. Linn. Soc. xv., p., 309.)

A. nanum, *Baker*.—Mexico, Coulter 1564. (Journ. Linn. Soc. xv., p. 305.)

A. nidulans, *Baker*.—E. Trop. Africa. (Journ. Linn. Soc. xv., p. 314.)

A. nubicum, *Baker*.—Nubia. (Journ. Linn. Soc. xv., p. 301.)

A. pachyphyllum, *Baker*.—Cape. (Journ. Linn. Soc. xv., p. 304.)

A. pubescens, *Baker*.—S. Africa. (Journ. Linn. Soc. xv., p. 309.)

A. pubirachis, *Baker*.—Guinea. (Journ. Linn. Soc. xv., p. 302.)

A. pudicum, *Baker*.—Cape, Zeyher 1070. (Journ. Linn. Soc. xv., p. 308.)

A. Saltii, *Baker*.—Abyssinia. (Journ. Linn. Soc. xv., p. 308.)

A. Skinneri, *Baker*.—Guatemala. (Journ. Linn. Soc. xv., p. 313.)

A. sphacelatum, *Baker*.—Angola. (Journ. Linn. Soc. xv., p. 303.)

A. stenocarpum, *Baker*.—Mexico. (Journ. Linn. Soc. xv., p. 317.)

A. subpetiolatum, *Baker*.—E. Trop. Africa. (Journ. Linn. Soc. xv., p. 302.)

A. Torreyi, *Baker*.—Mexico, Wright 690, 1912; Fendler 851. (Journ. Linn. Soc. xv., p. 317.)

A. vestitum, *Baker*.—Mexico. (Journ. Linn. Soc. xv., p. 307.)

A. zanguebaricum, *Baker*.—Zanzibar. (Journ. Linn. Soc. xv., p. 302.)

Anthurium Bakeri, *Hook. f.* (Aroideæ).—Costa Rica. (Bot. Mag., t. 6261.)

A. Brownii, *Mast*.—N. Grenada. (Gard. Chron. i., p. 744, figs. 139, 140.)

A. Saundersii, *Hook. f.*—S. America. (Bot. Mag., t. 6218.)

A. Veitchii, *Mast*.—N. Grenada. (Gard. Chron. i., p. 772, figs. 142, 143.)

Aporosa tetrapleura, *Hance* (Artocarpaceæ).—Cambodia. (Journ. Bot., p. 260.)

Aristea juncifolia, *Baker* (Iridaceæ).—Cape. (Journ. Bot., p. 267.)

A. madagascariensis, *Baker*.—Madagascar. (Journ. Bot., p. 267.)

A. racemosa, *Baker*.—Cape, Burchell 7883. (Journ. Bot., p. 267.)

A. schizolæna, *Harv. MSS*.—Cape. (Journ. Bot., p. 267.)

ARISTOLOCHIA ARENICOLA, *Hance* (Aristolochiaceæ).—Cambodia. (Journ. Bot., p. 261.)

ARTHROPODIUM NEO-CALEDONICUM, *Baker* (Liliaceæ).—New Caledonia, Vieillard 1395. (Journ. Linn. Soc. xv., p. 352.)

ARTHROSOLEN GLAUCESCENS, *Oliv.* (Thymeleæ).—Trop. Africa. (Journ. Linn. Soc. xv., p. 96.)

ARUNDINARIA FLEXUOSA, *Hance* (Gramineæ).—China. (Journ. Bot., p. 340.)

ASPASIA PAPILIONACEA, *Rchb. f.* (Orchideæ).—Costa Rica? (Gard. Chron. ii., p. 100.)

ASPHODELINE AMBIGUA, *Gay Herb.* (Liliaceæ).—Hort. Paris. (Journ. Linn. Soc. xv., p. 276.)

A. PARVIFLORA, *Baker*.—Constantinople. (Journ. Linn. Soc. xv., p. 276.)

BABIANA BAINESII, *Baker* (Irideæ).—S. Africa. (Journ. Bot., p. 335.)

B. CUNEIFOLIA, *Baker*.—Cape, Drège 2627. (Journ. Bot., p. 335.)

B. DREGEI, *Baker*.—Cape, Drège 2628. (Journ. Bot., p. 336.)

BACTRIS AUBLETIANA, *Trail* (Palmæ).—Guiana. (Journ. Bot., p. 373.)

BARLERIA LIMNOGETON, *S. Moore* (Acanthaceæ).—Trop. Africa. (Journ. Linn. Soc. xv., p. 95.)

BASSIA? [PIERREA] KRANTZII, *Hance* (Sapotaceæ).—Cambodia and Cochin-China. (Journ. Bot., p. 260.)

BAUHINIA RIEDELII, *Baker* (Leguminosæ).—Celebes. (Journ. Linn. Soc. xv., p. 98.)

BEGONIA DAVISII, *Hort. Veitch.* (Begoniaceæ).—Peru. (Bot. Mag., t. 6252.)

BOLLEA CŒLESTIS, *Rchb. f.* (Orchideæ).—W. Trop. America. (Gard. Chron. i., p. 756.)

BOMAREA CARDERI, *Mast.* (Amaryllideæ).—N. Grenada. (Gard. Chron. i., p. 795.)

BROOKEA DASYANTHA, *Benth.* (Scrophulariaceæ).—Borneo, Beccari 1145, 3203. (Ic. Plant., t. 1197.)

BULBINE DENSIFLORA, *Baker* (Liliaceæ).—S. Africa. (Journ. Linn. Soc. xv., p. 347.)

B. FILIFOLIA, *Baker*.—S. Africa. (Journ. Linn. Soc. xv., p. 344.)

B. LAXIFLORA, *Baker*.—S. Africa. (Journ. Linn. Soc. xv., p. 347.)

B. MINIMA, *Baker*.—Cape, Drège 953. (Journ. Linn. Soc. xv., p. 344.)

B. PALLIDA, *Baker*.—Kaffraria. (Journ. Bot., p. 184.)

B. URGINEOIDES, *Baker*. — S. Africa. (Journ. Linn. Soc. xv., p. 348.)

B. ZEYHERI, *Baker*.—Cape, Zeyher 4219, 4224. (Journ. Linn. Soc. xv., p. 347.)

CÆSIA SETIFERA, *Baker* (Liliaceæ).—N. Australia. (Journ. Linn. Soc. xv., p. 359.)

CALLITRICHE LACHII, *Warren* (Callitrichineæ).—Cheshire, England. (Journ. Bot., p. 279.)

CALYDOREA GARDNERI, *Baker* (Iridaceæ).—Brazil, Gardner 2322. (Journ. Bot., p. 188.)

CALYPTRONOMA ROBUSTA, *Trail* (Palmæ).—Brazil. (Journ Bot., p. 330, tab. 183.)

CAMAROTIS COCHINCHINENSIS, *Rchb. f.* (Orchideæ).—Cochin-China. (Gard. Chron. ii., p. 740.)

CARDAMINE LAMONTII, *Hance* (Cruciferæ).—Hongkong. (Journ. Bot., p. 363.)

CATTLEYA FELIX, *Rchb. f.* (hybrid, *C. Schilleriana* × *Lælia crispa*) (Orchideæ).—Gard. Chron. ii., p. 68.)

C. MITCHELLI, *Rchb. f.* (hybrid) (Orchideæ).—(Gard. Chron. ii., p. 386.)

CENTROLEPIS CAMBODIANA, *Hance* (Centrolepideæ). — Cambodia. (Journ. Bot., p. 14.)

CHLAMYDOSTYLUS, *Baker* (Iridaceæ).

C. CERNUUS, *Baker*.—Guatemala. (Journ. Bot., p. 186.)

C. MEDUSA, *Baker*.—Brazil. (Journ. Bot., p. 186.)

C. MULTIFLORUS, *Baker*.—Mexico. (Journ. Bot., p. 186.)

CHLOROPHYTUM ACAULE, *Baker* (Liliaceæ).—India Orient. (Journ. Linn. Soc. XV., p. 327.)

C. AFZELII, *Baker*. — Sierra Leone. (Journ. Linn. Soc. XV., p. 323.)

C. ALISMÆFOLIUM, *Baker*.—W. Trop. Africa, Mann 1030. (Journ. Linn. Soc. XV., p. 324.)

C. AMPLEXICAULE, *Baker*.—Trop. Africa. (Journ. Linn. Soc. XV., p. 325.)

C. ARUNDINACEUM, *Baker*. — Himalaya, Hook f. & Th. n. 5; Griffith 5795. (Journ. Linn. Soc. XV., p. 323.)

C. BOWKERI, *Baker*.—Cape. (Journ. Linn. Soc. XV., p. 332.)

C. BURCHELLII, *Baker*.—Cape, Burchell 3650. (Journ. Linn. Soc. XV., p. 330.)

C. HEYNEI, *Baker*.—India, Hook f. & Th. no. 6; Ceylon, Thwaites 2291. (Journ. Linn. Soc. XV., p. 322.)

C. JUNCIFOLIUM, *Baker*. — Entre Rios. (Journ. Linn. Soc. XV., p. 333.)

C. MACROSPORUM, *Baker*.—S. Africa. (Journ. Linn. Soc. XV., p. 330.)

C. MALABARICUM, *Baker*.—India. (Journ. Linn. Soc. XV., p. 331.)

C. MODESTUM, *Baker*.—Natal, Krauss 177. (Journ. Linn. Soc. XV., p. 329.)

C. PETIOLATUM, *Baker*.—Cameroon Mts., Mann 2132. (Journ. Linn. Soc. XV., p. 326.)

C. PUBIFLORUM, *Baker*.—Zambesi. (Journ. Linn. Soc. XV., p. 329.)

C. SPARSIFLORUM, *Baker*.—Fernando Po, Mann 388. (Journ. Linn. Soc. XV., p. 325.)

C. STENOPETALUM, *Baker*.—Niger River. (Journ. Linn. Soc. XV., p. 331.)

C. TINNEÆ, *Baker*.—Æthiopia. (Journ. Linn. Soc. XV. p. 333.)

C. VESTITUM, *Baker*.—Zambesi. (Journ. Linn. Soc. XV., p. 327.)

CISSUS HAHNIANUS, *Ernst* (Ampelideæ).—Venezuela. (Journ. Bot., p. 179.)

CLERODENDRON RIEDELII, *Oliv.* (Verbenaceæ).—Celebes. (Journ. Linn. Soc. XV., p. 100.)

COINOCHLAMYS ANGOLANA, *S. Moore* (Acanthaceæ).—Angola, Soyaux 156. (Journ. Bot., p. 322, tab. 182.)

CROCUS PARVIFLORUS, *Baker* (Iridaceæ).—Cilician Taurus. (Journ. Bot., p. 266.)

CUDRANIA RECTISPINA, *Hance* (Artocarpaceæ).—China. (Journ. Bot., p. 365.)

CYCLONEMA SPINESCENS, *Oliv.* (Verbenaceæ).—Trop. Africa. (Journ. Linn. Soc. xv., p. 96.)

CYPELLA BRACHYPUS, *Baker* (Irideæ).—Trinidad. (Gard. Chron. i., p. 138.)

C. PERUVIANA, *Baker*.—Peru. (Bot. Mag., t. 6213.)

CYPHONEMA BUCHANANI, *Baker* (Amaryllidaceæ).—Natal. (Journ. Bot., p. 66.)

CYPRIPEDIUM MARMOROPHYLLUM, *Rchb. f.* (hybrid, *C. barbatum* × *C. Hookeræ*) (Orchideæ).—(Gard. Chron. ii., p. 130.)

C. ŒNANTHUM, *Rchb. f.* (hybrid, *C. insigne* × *C. Harrisianum*) (Orchideæ).—(Gard. Chron. ii., p. 297.)

C. PYCNOPTERUM, *Rchb. f.* (hybrid) (Orchideæ).—(Gard. Chron. i., p. 622.)

C. STENOPHYLLUM, *Rchb. f.* (hybrid, *C. Schlimii* × *C. Pearcei*) (Orchideæ).—(Gard. Chron. i , p. 461.)

C. SUPERCILIARE, *Rchb. f.* (hybrid, *C. barbatum* × *C. superbiens*) (Orchideæ).—(Gard. Chron. i., p. 795.)

C. SWANIANUM, *Rchb. f.* (hybrid, *C. Dayanum* × *C. barbatum*) (Orchideæ).—(Gard Chron. ii., p. 36.)

CYRTANTHUS LUTEUS, *Baker* (Amaryllidaceæ).—Natal. (Journ. Bot., p. 66.)

C. TUCKII, *Baker* (Amaryllidaceæ).—S. Africa. (Journ. Bot., p. 183.)

DAPHNIPHYLLUM PIERREI, *Hance* (Daphniphyllaceæ).—Cambodia. (Journ. Bot., p. 261.)

DENDROBIUM ENDOCHARIS, *Rchb. f.* (hybrid, *D. heterocarpum* × *D. moniliforme*) (Orchideæ).—Gard. Chron. i., p. 298.)

D. NITIDISSIMUM, *Rchb. f.* (Orchideæ).—Admiralty Islands. (Journ. Linn. Soc. xv., p. 113.)

D. OPHIOGLOSSUM, *Rchb. f.*—Cape York. (Journ. Linn. Soc. xv., p. 113.)

D. RHODOSTOMA, *Rchb. f.* (hybrid, *D. Huttoni* × *D. sanguinolentum*). —(Gard. Chron. i., p. 795.)

D. SUPERBIENS, *Rchb. f.* (Orchideæ).—North Australia. (Gard. Chron. ii., p. 516.)

DESMONCUS PALUSTRIS, *Trail* (Palmæ).—Brazil. (Journ. Bot., p. 353.)

D. PUMILUS, *Trail*.—Brazil. (Journ. Bot., p. 335, tab. 183.)

DIPTEROCARPUS INSULARIS, *Hance* (Dipterocarpaceæ).—Cambodia. (Journ. Bot., p. 241.)

DISA BORBONICA, *Balf. f. & S. Moore* (Orchideæ).—Bourbon. (Journ. Bot., p. 293.)

DRYOBALANOPS SCHEFFERI, *Hance* (Dipterocarpaceæ).—Sumatra. (Journ. Bot., p. 307.)

DUVALIA POLITA, *N. E. Brown* (Asclepiadeæ).—Cape Colony. (Gard. Chron. ii., p. 130, and Bot. Mag., t. 6245.)

ECTADIOPSIS NIGRITANA, *Benth.* (Asclepiadeæ).—W. Trop. Africa. (Ic. Plant., t. 1187.)

EDGARIA, *C. B. Clarke* (Cucurbitaceæ).

E. DARJEELINGENSIS, *C. B. Clarke.*—Sikkim. (Journ. Linn. Soc. xv., p. 114.)

ELATOSTEMA MARIANNÆ, *C. B. Clarke* (Urticaceæ).—Sikkim. (Journ. Linn. Soc. xv., p. 124.)

E. SIKKIMENSE, *C. B. Clarke.*—Sikkim. (Journ. Linn. Soc. xv., p. 124.)

EPISCIA ERYTHROPUS (Gesneraceæ).—New Grenada. (Bot. Mag., t. 6219.)

EREMURUS ANGUSTIFOLIUS, *Baker* (Liliaceæ).—Afghanistan, Griffith 5799. (Journ. Linn. Soc. xv., p. 282)

E. AURANTIACUS, *Baker.*—Afghanistan, Griffith 500. (Journ. Linn. Soc. xv., p. 285.)

E. CAPPADOCICUS, *Gay MS.*—Cappadocia, Aucher-Eloy 2166, 2332.

E. GRIFFITHII, *Baker.*—Afghanistan, Griffith 5803. (Journ. Linn. Soc. xv., p. 283.)

E. HIMALAICUS, *Baker.*—Himalaya. (Journ. Linn. Soe. xv., p. 283.)

E. STOCKSII, *Baker.*—Beloochistan, Stocks 1057. (Journ. Linn. Soc. xv., p. 283.)

ERIOCHRYSIS PORPHYROCOMA, *Hance* (Gramineæ).—China. (Journ. Bot., p. 294.)

ERIOSEMA RHYNCHOSIOIDES, *Baker* (Leguminosæ).—Trop. Africa. (Journ. Linn. Soc. xv., p. 94.)

ERIOSPERMUM ALBUCOIDES, *Baker* (Liliaceæ).—Cape. (Journ. Linn. Soc. xv., p. 265.)

E. BOWIEANUM, *Baker.*—Cape. (Journ. Linn. Soc. xv., p. 267.)

E. BREVIPES, *Baker.*—S. Africa. (Journ. Linn. Soc. xv., p. 263.)

E. CALCARATUM, *Baker.* Cape. (Journ. Linn. Soc. xv., p. 264.)

E. COOPERI, *Baker.*—S. Africa, Cooper 3307. (Journ. Linn. Soc. xv., p. 265.)

E. CORYMBOSUM, *Baker.*—S. Africa. (Journ. Linn. Soc. xv., p. 266.)

E. KIRKII, *Baker.*—Zambesi. (Journ. Linn. Soc. xv., p. 267.)

E. ORNITHOGALOIDES, *Baker.*—Natal. (Journ. Linn. Soc. xv., p. 266.)

FUCHSIA HIRSUTA, *Hemsl.* (Onagraceæ).—Peru. (Journ. Bot., p. 69.)

F. INSIGNIS, *Hemsl.*—Ecuador. (Journ. Bot., p. 69.)

F MEMBRANACEA, *Hemsl.*—Venezuela. (Journ. Bot., p. 70.)

F. SALICIFOLIA, *Hemsl.*—Sandillani. (Journ. Bot., p. 70.)

FUNKIA FORTUNEI, *Baker* (Liliaceæ).—China. (Gard. Chron. ii., p. 36.)

GAMOCHLAMYS HETERANDRA, *Baker* (Aroideæ).—Africa. (Gard. Chron. ii., p. 164.)

GASTERIA DICTA, *N. E. Brown* (Liliaceæ).—Cape Colony. (Gard. Chron. ii., p. 68.)

GEISSORHIZA BOJERI, *Baker* (Iridaceæ).—Madagascar. (Journ. Bot,, p. 239.)

G. ERECTA, *Baker.*—Cape, Drège, 8468. (Journ. Bot., p. 238.)

G. FILIFOLIA, *Baker.*—Cape, Drège 8476. (Journ. Bot., p. 239.)

G. PURPUREO LUTEA, *Baker*.—Cape, Drège 8476. (Journ. Bot., p. 238.)

G. MINIMA, *Baker*.—Cape, Drège 2623. (Journ. Bot., p. 239.)

G. WRIGHTII, *Baker*.—Cape. (Journ. Bot., p. 238.)

GEONOMA ACAULIS, *Mart.*, subsp. *G. Tapajotensis* (Palmæ).—Brazil. (Journ. Bot., p. 324.)

G. CAMANA, *Trail*.—Brazil. (Journ. Bot , p. 324.)

G. LEPTOSPADIX, *Trail*.—Brazil. (Journ. Bot., p. 327, tab. 183.)

G. OLIGOCLONA, *Trail*.—Brazil. (Journ. Bot., p. 325, tab. 183.)

G. SPRUCEANA, *Trail*.—Brazil. (Journ. Bot., p. 328.)

G. TAMANDUA, *Trail*.—Brazil. (Journ. Bot., p. 323.)

GLADIOLUS ATROPURPUREUS, *Baker* (Irideæ).—Zambesi. (Journ. Bot., p. 335.)

G. COCHLEATUS, *Baker*.—Sierra Leone. (Journ. Bot., p. 333.)

G. CRASSIFOLIUS, *Baker*.—S. Africa. Cooper 3185, 3199. (Journ. Bot., p. 334.)

G DECORATUS, *Baker*.—Zambesi. (Journ. Bot., p. 334.)

G. IGNESCENS, *Bojer MS*.—Madagascar. (Journ. Bot , p. 334.)

G. LONGICOLLIS, *Baker* (Iridaceæ). — Kaffraria. (Journ. Bot., p. 182.)

G. MELLERI, *Baker*.—Zambesi. (Journ. Bot., p. 334.)

G. NEWII, *Baker*.—E. Trop. Africa. (Journ. Bot., p. 335.)

G. OCHROLEUCUS.—S. Africa. (Journ. Bot., p. 182.)

G. PUBESCENS, *Baker*. — Kaffraria, Cooper 458. (Journ. Bot., p. 333.)

G. SPLENDENS, *Baker*.—Cape. (Journ. Bot., p. 333.)

G. TENUIS, *Baker*.—S. Africa, Burchell 7303, 7421. (Journ. Bot., p. 335.)

GLYCERIA TONGLENSIS, *C. B. Clarke* (Gramineæ).—Sikkim. (Journ. Linn. Soc. XV., p. 119.)

GLYCOSMIS SINGULIFLORA, *Kurz* (Rutaceæ).—Assam. (Journ. Bot., p 38, tab. 174.)

GRIFFINIA ORNATA, *T. Moore* (Amaryllideæ).—Brazil. (Gard. Chron. i., p. 266.)

GUTENBERGIA POLYCEPHALA, *Oliv. & Hiern* (Compositæ).—Trop. Africa. (Journ. Linn. Soc. XV., p. 95.)

GYMNADENIA TRYPHIÆFORMIS, *Rchb. f.* (Orchideæ).—China and Korea. (Journ. Bot., p. 209.)

GYMNOLÆMA NEWII, *Benth.* (Asclepiadeæ).—E. Trop. Africa. (Ic. Plant., t. 1186.)

HABENARIA TERNATEA, *Rchb. f.* (Orchideæ).—Ternate. (Journ. Linn. Soc. XV., p. 112.)

HAWORTHIA DISTINCTA, *N. E. Brown* (Liliaceæ).—Cape Colony. (Gard. Chron. ii., p. 130.)

HESPERANTHA BAURII, *Baker* (Iridaceæ).—Kaffraria. (Journ. Bot., p. 182.)

H. BULBIFERA, *Baker*.—S. Africa. (Journ. Bot., p. 183.)

H. HUMILIS, *Baker*.—Cape, Burchell 1320. (Journ. Bot., p. 239.)

H. RUBELLA, *Baker*.—Cape, Cooper 1027. (Journ. Bot., p. 239.)

HETEROTOMA MACROCENTRON, *Benth.* (Campanulaceæ).—Mexico. (Ic. Plant., t. 1177.)

HIRTELLA ZANZIBARICA, *Oliver* (Rosaceæ).—E. Trop. Africa. (Ic. Plant., t. 1193.)

HOLOTHRIX VATKEANA, *Rchb. f.* (Orchideæ).—Somali-land, Hildebrandt 1465. (Journ. Bot., p. 346.)

HOODIA BARKLYI, *Dyer* (Asclepiadeæ).—S. Africa. (Journ. Linn. Soc. xv., p. 252).

HOPEA PIERREI, *Hance* (Dipterocarpaceæ).—Cambodia. (Journ. Bot., p. 308 and 242.)

HYDNOPHYTUM *sp. nov.?* (Rubiaceæ). (Journ. Linn. Soc. xv., p. 76.)

HYPOXIS BAURII, *Baker* (Hypoxideæ).—Kaffraria. (Journ. Bot., p. 181.)

H. BIFLORA, *Baker*.—Kaffraria. (Journ. Bot., p. 181.)

H. LUDWIGII, *Baker*.—Kaffraria. (Journ. Bot., p. 181.)

ILEX BUXIFOLIA, *Hance* (Ilicineæ).—China. (Journ. Bot., p. 364.)

ILLICIUM CAMBODIANUM, *Hance* (Magnoliaceæ).—Cambodia. (Journ. Bot., p. 240.)

INDIGOFERA CAMERONI, *Baker* (Leguminosæ).—Trop. Africa. (Journ. Linn. Soc. xv., p. 93.)

I. CUNEATA, *Baker*.—Trop. Africa. (Journ. Linn. Soc. xv., p. 92.)

I. DISSITIFLORA, *Baker*.—Trop. Africa. (Journ. Linn. Soc. xv., p. 93.

IRIS GONIOCARPA, *Baker* (Irideæ).—Sikkim. (Gard. Chron. ii., p. 710.)

I. HAYNEI, *Baker*.—Palestine. (Gard. Chron. ii., p. 710.)

I. HARTWEGII, *Baker*.—California. (Gard. Chron. ii., p. 323.)

IXIA MICRANDRA, *Baker* (Iridaceæ).—Cape, Drège 8272; Zeyher 4009, 10, 11. (Journ. Bot., p. 237.)

KERAMANTHUS (Passifloreæ); *K. Kirkii*, Hook. f.—Zanzibar. (Bot. Mag., t. 6271.)

KRAUSSIA CONGESTA, *Oliv.* (Rubiaceæ).—Trop. Africa. (Journ. Linn. Soc. xv., p. 95.)

LÆLIA DAYANA, *Rchb. f.* (Orchideæ).—Brazil. (Gard. Chron. ii., p. 772)

L. MYLAMIANA, *Rchb. f.* (hybrid, *L. crispa* × *Cattleya granulosa*).—(Gard. Chron. ii., p. 740.)

LAGERSTROEMIA RIEDELIANA, *Oliv.* (Lythraceæ).—Celebes. (Journ. Linn. Soc. xv., p. 90)

LAPEYROUSIA BAINESII, *Baker* (Irideæ).—S. Africa. (Journ. Bot., p. 338.)

L. DIVARICATA, *Baker*.—Cape. (Journ Bot., p. 337.)

L. MACROCHLAMYS, *Baker*.—Cape. (Journ. Bot., p. 338.)

LEPTACTINIA HEINSIOIDES, *Hiern* (name only) (Rubiaceæ).—Trop. Africa. (Journ. Linn. Soc. xv., p. 91.)

LORANTHUS STENOPETALUS, *Oliv.* (Loranthaceæ).—Celebes. (Journ. Linn. Soc. xv., p. 99.)

LYCASTE DENNINGIANA, *Rchb. f.* (Orchideæ).—Equador? (Gard. Chron. ii., p. 808.)

LYONSIA? CELEBICA, *Oliv.* (Apocynaceæ).—Celebes. (Journ. Linn. Soc. xv., p. 99.)

MASDEVALLIA BARLÆANA, *Rchb. f.* (Orchideæ).—Peru. (Gard. Chron. i., p. 170.)

M. GIBBEROSA, *Rchb. f.*—N. Grenada. (Gard. Chron. i., p. 8.)
M. GARGANTUA, *Rchb. f.*—N. Grenada. (Gard. Chron. ii., p. 516.)
M. KLABOCHORUM, *Rchb. f.*—W. South America. (Gard. Chron. i., p. 720.)
M. PSITTACINA, *Rchb. f.*—N. Grenada. (Gard. Chron. i., p. 817.)
M. TRIARISTELLA, *Rchb. f.*—Costa Rica. (Gard. Chron. ii., p. 226; Bot. Mag., t. 6268.)
MASSONIA VERSICOLOR, *Baker* (Liliaceæ).—S. Africa. (Journ. Bot., p. 184.
MATHURINA, *Balf. fil.* (Turneraceæ); *M. penduliflora*, Balf. f.—Rodriguez. (Journ. Linn. Soc. xv., p. 160.)
MAXILLARIA SPECIOSA, *Rchb. f.* (Orchideæ).—N. Grenada. (Gard. Chron. i., p. 197.)
MAZUS VILLOSUS, *Hemsl.* (Scrophulariaceæ).—China. (Journ. Bot., p. 209.)
MELIOSMA SQUAMULATA, *Hance* (Sabiaceæ). — China. (Journ. Bot., p. 364.)
MESEMBRYANTHEMUM SETULIFERUM, *N. E. Brown* (Molluginеæ).—Cape Colony. (Gard. Chron. ii., p. 8.)
M. VITTATUM, *N. E. Brown.*—Cape Colony. (Gard. Chron. ii., p. 772.)
MESOSPINIDIUM JUCUNDUM, *Rchb. f.* (Orchideæ). — Brazil. (Gard. Chron. ii., p. 580.)
MONOPYLE LEUCANTHA, *Moritz MS.* (Gesneraceæ).—Caracas, Moritz 868; Fendler 794; Linden 254. (Ic. Plant. xii., p. 87.)
M. MACROCARPA, *Benth.*—Peru, Spruce 4151. (Ic. Plant. xii., t. 1198.)
M. MACROPHYLLA, *Benth.*—Columbia. (Ic. Plant. xii., p. 86.)
M. PANICULATA, *Benth.*—Equador, Spruce 5071. (Ic. Plant. xii., p. 86.)
M. RACEMOSA, *Benth.*—New Grenada. (Ic. Plant. xii., p. 87.)
M. SUBSESSILIS, *Benth.*—Peru. (Ic. Plant. xii., p. 86.)
MONTBRETIA PAUCIFLORA, *Baker* (Irideæ). — Cape. (Journ. Bot., p. 336.)
M. STRIATA, *Baker.*—Cape. (Journ. Bot., p. 337.)
MORENIA INTEGRIFOLIA, *Trail* (Palmæ). — Brazil. (Journ. Bot., p. 331.)
MORPHIXIA COOPERI, *Baker* (Iridaceæ).—Cape, Cooper 1628, 1683. (Journ. Bot., p. 237.)
M. JUNCIFOLIA, *Baker* (Iridaceæ).—Cape. (Journ. Bot., p. 238.)
M. NERVOSA, *Baker.*—Cape, Zeyher 1632. (Journ. Bot., p. 237.)
M. TRICHORHIZA, *Baker.*—Natal. (Journ. Bot., p. 237.)
MOSTEUA SURINAMENSIS, *Benth.* (Loganiaceæ).—Surinam, Hostmann 1128. (Ic. Plant., t. 1196.)
MUSCARI ÆSTIVALE, *Baker* (Liliaceæ).—Hort. Elwes. (Bot. Mag., t. 6269.)
NOTONERIUM GOSSEI, *Benth.* (Apocyneæ).—South Australia. (Ic. Plant., t. 1180.)
ODONTOGLOSSUM BAPHIACANTHUM, *Rchb. f.* (Orchideæ) (hybrid? *O. odoratum* × *O. crispum?*). — N. Grenada. (Gard. Chron. ii., p. 260.)
O. CLAVICEPS, *Rchb. f.*—Equador. (Gard. Chron. ii., p. 516.)

O. HUMEANUM, *Rchb. f.* (hybrid, *O. cordatum* × *O. Rossii*) —Gard. Chron. i., p. 170.)

O. LONDESBOROUGHIANUM, *Rchb. f.*—Mexico. (Gard. Chror. ii., p. 772.)

O. VEXATIVUM, *Rchb. f.* (hybrid?).—Mexico. (Gard. Chron. ii., p. 808.)

ONCIDIUM LAMELLIGERUM, *Rchb. f.* (Orchideæ).—Ecuador. (Gard. Chron. ii., p. 808.)

O. LANSBERGII, *Rchb. f*—Venezuela. (Gard. Chron. i., p. 460.)

O. METALLICUM, *Rchb. f.*—N. Grenada. (Gard. Chron. i., p. 394.)

O. VIRGULATUM, *Rchb. f.*—Equador. (Gard. Chron. ii., p. 452.)

ONCOSPERMA CAMBODIANUM, *Hance* (Palmæ).—Cambodia. (Journ Bot., p. 261.)

PARKIA STREPTOCARPA, *Hance* (Leguminosæ).—Cambodia. (Journ. Bot., p. 258.)

PERISTYLUS SACCULATUS, *Balf. f.* & *S. Moore* (Orchideæ).—Bourbon. (Journ. Bot., p. 293.)

PESCATOREA EUGLOSSA, *Rchb. f.* (Orchideæ).—Gard. Chron. ii., p. 808.)

PHYLLOSTACHYS NEVINII, *Hance* (Gramineæ).—China. (Journ. Bot., p. 295.)

PILEA APPROXIMATA, *C. B. Clarke* (Restiaceæ).—Sikkim. (Journ. Linn. Soc. xv., p. 123.)

PLEIOCARPA MUTICA, *Benth.* (Apocyneæ).—W. Trop. Africa, Mann 2277. (Ic. Plant., 1181.)

P. ROSTRATA, *Benth.*—W. Trop. Africa. (Ic. Plant. t. 1182.)

PLEUROTHALLIS PYRSODES, *Rchb.f.* (Orchideæ).—Central America? (Gard. Chron. ii., p. 386.)

PLOCOSPERMA BUXIFOLIUM, *Benth.* (Loganiaceæ).—Guatemala. (Ic. Plant., t. 1195.)

PLUMBAGO AMPLEXICAULIS, *Oliv.* (Plumbagineæ).—Trop. Africa. (Journ. Linn. Soc. xv., p. 96.)

PYCNOBOTRYA NITIDA, *Benth.* (Apocyneæ).—W. Trop. Africa. (Ic. Plant., t. 1183.)

RAMPINIA, *C. B. Clarke* (Cucurbitaceæ); *R. herpetospermoides*, C. B. Clarke.—Sikkim. (Journ. Linn. Soc. xv., p. 129.)

RHAMPHICARPA CAMERONIANA, *Oliv.* (Scrophulariaceæ).—Trop. Africa. (Journ. Linn. Soc. xv., p. 95.)

ROMULEA BARBATA, *Baker* (Iridaceæ).—Cape. (Journ. Bot., p. 236.)

RHYNCHOSTIGMA RACEMOSUM, *Benth.* (Asclepiadeæ).—W. Trop. Africa. (Ic. Plant., t. 1189.)

R. CAMEROONIANA, *Baker.*—Cameroon Mts., Mann 2135. (Journ. Bot., p. 236.)

R. CUPREA, *Baker.*—Cape. (Journ. Bot., p. 236.)

R. LATIFOLIA, *Baker.*—Cape. (Journ. Bot., p. 237.)

R. MACOWANI, *Baker.*—Cape. (Journ. Bot., p. 236.)

RUBUS MACROCARPUS, *Kurz MS.* (Rosaceæ).—Sikkim. (Journ. Linn. Soc. xv., p. 141.)

RUELLIA SECLUSA, *S. Moore* (Acanthaceæ).—China. (Journ. Bot., p. 208.)

SAURAUJA LONGIFOLIA, *Oliv.* (Dilleniaceæ).—Celebes. (Journ. Linn. Soc. xv., p. 98.)

SCHLIMIA TRIFIDA, *Rchb. f.* (Orchideæ).—N. Grenada. (Gard. Chron. i., p. 708.)

SCILLA PUSILLA, *Baker* (Liliaceæ).—Kaffraria. (Journ. Bot., p. 183.)

SENECIO (KLEINIA) CHORDIFOLIA, *Hook. f.* (Compositæ).—S. Africa. (Bot. Mag., t 6216.)

SHOREA HYPOCHRA, *Hance* (Dipterocarpaceæ). — Cambodia. (Journ. Bot., p. 242.

SISYRINCHIUM GLASIOVII, *Baker* (Iridaceæ)—Brazil, Glaziou 6732. (Journ. Bot., p. 268.)

S. GRACILE, *Klotzsch MSS.*—Brazil, Sello 3863. (Journ. Bot., p. 268.)

S. JAMESONI, *Baker.*—Ecuador, Jameson 246; Bolivia, Mandon 1214. (Journ. Bot., p. 269.)

S. LATERALE, *Baker.*—Bolivia, Mandon 1220. (Journ. Bot., p. 269.)

S. MANDONI, *Baker.*—Bolivia, Mandon 1217; New Grenada, Jurgensen 387. (Journ. Bot., p. 269.)

S. MONOSTACHYUM, *Baker.*—Uruguay. (Journ. Bot., p. 268.)

S. PACHYRHIZUM, *Baker.*—Brazil, Sello 3862. (Journ. Bot., p. 269.)

S. TRINERVE, *Baker.*—Bolivia, Mandon 1218, 1220 bis. (Journ. Bot., p. 267.)

S. WEIRII, *Baker.*—Brazil, Weir 372. (Journ. Bot., p. 268.)

SPHŒROCODON NATALENSE. *Benth.* (Asclepiadeæ).—Natal. (Ic. Plant. xii., p. 79.)

S. OBTUSIFOLIUM, *Benth.*—S. E. Trop. Africa. (Ic. Plant., t. 1190.)

STANHOPEA SHUTTLEWORTHII, *Rchb. f.* (Orchideæ).—N. Grenada. (Gard. Chron. i., p. 795)

STAPELIA GLABRIFOLIA, *N. E. Brown* (Asclepiadeæ).—Cape Colony. (Gard. Chron. i., p. 809, fig. 149.)

STERCULIA LYCHNOPHORA, *Hance* (Sterculiaceæ).—Cambodia. (Journ. Bot., p. 242.)

STIPA INEBRIANS, *Hance* (Gramineæ).—Mongolia. (Journ. Bot., p. 212.)

SWINTONIA PIERREI, *Hance* (Anacardiaceæ).—Cambodia. (Journ. Bot., p. 257.)

SYMPLOCOS URCEOLARIS, *Hance* (Styraceæ).—China. (Journ. Bot., p. 307.)

SYNAPTOLEPIS ALTERNIFOLIA, *Oliv.* (Thymeleæ).—E. Trop. Africa. (Ic. Plant., t. 1194.)

SYRINGODEA BICOLOR, *Baker* (Irideæ).—Cape. (Journ. Bot., p. 67.)

S. FILIFOLIA, *Baker.*—Cape. (Journ. Bot., p. 67.)

TACCA PALMATIFIDA, *Baker* (Taccaceæ).—Celebes. (Journ. Linn. Soc. xv., p. 100.)

TALINUM ARNOTII, *Hook. f.* (Portulaceæ).—S. Africa. (Bot. Mag., t. 6220.)

TARRIETIA RIEDELIANA, *Oliv.* (Sapindaceæ).—Celebes. (Journ. Linn. Soc. xv., p. 98.)

THYSANOTUS ARBUSCULA, *Baker.*—W. Australia. (Journ. Linn. Soc. xv., p. 339.)

T. DRUMMONDII, *Baker.*—W. Australia. (Journ. Linn. Soc. xv., p. 341.)

T. THYRSOIDEUS, *Baker.*—W. Australia. (Journ. Linn. Soc. xv., p. 336.)

TRICORYNE MURICATA, *Baker* (Liliaceæ).—E. Australia. (Journ. Linn. Soc. xv., p. 363.)

T. PTEROCAULON, *Baker.*—E. Australia. (Journ. Linn. Soc. xv., p. 363.)

TRICHOCENTRUM INOPTHALMUM, *Rchb. f.* (Orchideæ).—Brazil. (Gard. Chron. ii., p. 100.)

TRICHOPILIA BACKHOUSIANA, *Rchb. f.* (Orchideæ).—N. Grenada. (Gard. Chron. i., p. 816.)

TRISTANIA RUFESCENS, *Hance* (Myrtaceæ).—Cambodia. (Journ. Bot., p. 259.)

TRITONIA BOLUSII, *Baker* (Irideæ).—Cape. (Journ. Bot., p. 337.)

VATICA ASTROTRICHA, *Hance* (Dipterocarpaceæ). — Cambodia. (Journ. Bot., p. 241.)

VENTILAGO SORORIA, *Hance* (Rhamnaceæ).—Cambodia. (Journ. Bot., p. 243.)

VERNONIA OBCONICA, *Oliv. & Hiern* (name only) (Compositæ) —Trop. Africa. (Journ. Linn. Soc. xv., p. 91.)

VITEX LINDENI, *Hook. f.* (Verbenaceæ).—New Grenada. (Bot. Mag., t. 6230.)

WAREA, *C. B. Clarke* (Cucurbitaceæ); *W. tonglensis*, C. B. Clarke. —Sikkim. (Journ. Linn. Soc. xv., p. 129.)

WATSONIA CYLINDRICA, *Baker* (Irideæ).—Madagascar. (Journ. Bot., p. 336.)

W. DENSIFLORA, *Baker.*—S. Africa, Cooper 886, 3186; Drège 4536. (Journ. Bot., p. 336.)

XIPHION DANFORDIÆ, *Baker* (Iridaceæ).—Cilician Taurus. (Journ. Bot., p. 265.)

XYRIS CAPITO, *Hance* (Xyrideæ).—Cambodia. (Journ. Bot., p. 262.)

ZYGODIA AXILLARIS, *Benth.* (Apocyneæ).—W. Trop. Africa. (Ic. Plant., t. 1184.)

Z. MYRTIFOLIA, *Benth.*—E. Trop. Africa. (Ic. Plant. xii., p. 73.)

Z. SUBSESSILIS, *Benth.*—Congo. (Ic. Plant. xii., p. 73.)

GEOGRAPHICAL STATISTICS OF THE EXTRA-BRITISH EUROPEAN FLORA.

By Thomas Comber.

(*Continued from* p. 117.)

Annuals, Biennials, and Perennials.—In the foregoing instances the results of the examination of the British flora have been confirmed; such is not the case in the comparison we now come to, for amongst Continental herbs Monocarps are found to give a higher average than Perennials. In this respect therefore the plants of the more Southern latitudes of Europe appear to differ from those more Northern in situation.

Species.		Average.
1472	Annuals	3·03
74	Annuals or Biennials	2·47
311	Biennials	2·39
1857	total Monocarps	2·90
3608	Perennials	2·62
260	doubtful duration	1·38

V. Dispersion according to character of the flower.—*Structure.*—The division of Phanerogams founded on well-known structural differences of the flower, compare with each other and with Cryptogams as follows:—

Species.		Average.
1335	Thalamifloræ	2·66
1365	Calycifloræ	2·60
2608	Monopetalæ	2·33
333	Apetalæ	3·81
5641	total Exogens	2·56
470	Petaloideæ	2·35
472	Glumaceæ	3·47
942	total Endogens	2·91
34	Cryptogams	6·98

Endogens thus exceed Exogens, while in each class the most simply organised divisions, Apetalæ and Glumaceæ, attain the highest average. The low dispersion of Continental Petaloideæ, amongst which there is a very inconsiderable proportion of aquatic plants, agrees completely with the low dispersion of the same division of British plants, excluding aquatics.

Inferior ovary.—Prof. De Candolle's observations as to the limited range of plants whose flowers have an inferior ovary, was corroborated

by the investigations of the British flora, and is further confirmed by the present lists, which divide as follows:—

Species.		Average.
2186	with ovary inferior	2·30
4369	other Phanerogams	2·76

Conspicuous flowers.—The relative range of plants bearing inconspicuously-coloured flowers, those with white, and those with brightly-coloured flowers, calculated from the British lists, is quite confirmed by a similar comparison of Continental plants.

Species.		Average.
805	of whole Orders having inconspicuous flowers	3·60
225	other plants with inconspicuous flowers	3·20
1030	total with inconspicuously-coloured flowers	3·51
1035	with white flowers	2·88
3657	with brightly-coloured flowers	2·28
861	with colour of flowers variable, unrecorded, or unknown	2·62

The difference per cent. between the three averages is indeed greater in the Continental than in the British result, as is seen if the figures are reduced to an equal standard, making them average 100 in each case. They then contrast as follows:—

	British.	Continental.
Inconspicuous	110	121
White	102	100
Coloured	88	79

VI. DISPERSION ACCORDING TO NATURE OF THE FRUIT.—*Fleshy fruit.*—The hypothesis that a succulent fruit secures for a plant a wider dispersion of its seeds, from their being swallowed by birds and other animals, and deposited with their power of germination unimpared, was hardly supported by the British averages, that of fleshy-fruited species only slightly exceeding that of dry-fruited. The Continental averages give a more decided result, as follows:—

Species.		Average.
168	with succulent fruit	3·27
6387	with dry fruit	2·59

As the proportion of fleshy-fruited species is considerably greater in the British flora than on the Continent, a much more marked, and perhaps a more correct contrast is obtained if we combine the British and Continental lists together. The averages of the whole European flora are then:—

Species.		Average.
239	with succulent fruit	5·20
7406	„ dry „	3·17

Dehiscence.—Dividing dry fruits into dehiscent and indehiscent, we have the following comparison, agreeing with that of British plants,

in which also the indehiscent fruit was found to be accompanied by a somewhat higher average :—

Species.		Average.
3498	with indehiscent fruit.	2·65
2889	,, dehiscent ,, ...	2·52

Special adaptation.—It is strange that plants bearing fruit to all appearances specially adapted for dispersion, being either provided with a pappus or other feathery appendage to facilitate its carriage by wind, or furnished with hooked spines or some other contrivance enabling it to cling to the coats of animals, should have an average specific area less than that of other plants; but such was the conclusion arrived at by Prof. De Candolle, such the result of the investigation respecting British plants, and such is again that of the present inquiry.

Species.		Average.
910	with pappus or other feathery appendage	2·18
146	,, grappling organs	2·50
5527	,, fruit not specially adapted . .	2·69

Taking Compositæ by themselves, the figures are :—

Species.		Average.
852	with pappus	2·10
265	without pappus	2·54

VII. DISPERSION ACCORDING TO CHARACTER OF THE SEED.—*Coma.*—While feathery organs on the *fruit* are thus found not to confer an extensive range, the case is otherwise with the coma, that answers the same purpose as a pappus, and is attached to the *seeds* of Salicineæ, many Asclepiadaceæ, and some genera of other Orders. This coma was shown by Prof. De Candolle and in my former paper to be accompanied by a high degree of dispersion, and the following averages are quite corroborative :—

Species.		Average.
49	with comose seeds	4·67
6534	seeds not comose	2·59

Size.—It was found impossible to draw the line between British plants with large and those with small seeds, the change in size being so gradual. The same difficulty is experienced with Continental plants, and I therefore again confine myself to comparing those Orders selected by Prof. De Candolle as being small-seeded, with the remaining Orders of Phanerogams. The difference between the two is very slight :—

Species.		Average.
1847	belonging to small-seeded Orders . .	2·66
4736	,, ,, other ,, . .	2·59

Number.—The production of numerous seeds has been considered an advantage likely to lead to wide dispersion. Amongst British

plants, however, it was found that species bearing seeds solitary in each cell had a rather more extensive average range than those with seeds two or more in the cell; and this proves to be likewise the case on the Continent.

Species.			Average.
3595	with seeds solitary in each cell	. .	2·66
2988	,, two or more seeds in each	. .	2·55

Testa.—The contrast presented by Continental plants, divided according to the nature of their testa, is similar to that by British. The highest average is attained by those species in which this outer coat is mucilaginous; next follow those which have it thin or membranous; and the lowest are those in which it is thick, hard, or crustaceous:—

Species.			Average.
3246	with testa thin or membranous	. .	2·66
506	,, ,, soft, cellulose, &c.	. .	2·74
1357	,, ,, thick, hard, or crustaceous	.	2·49

(*To be continued.*)

Notices of Books.

Prof. Strasburger's Researches on Protoplasm.

Ueber Zellbildung und Zelltheilung. By E. Strasburger. (Sur la formation et la division des Cellules. French translation by Jean-Jacques Kickx).

Studien ueber Protoplasma. By the same. Jena. 1876.

(Tab. 188.)

In the first of these works Prof. Strasburger records the results of his investigations on some phases of the life of animal and vegetable cells. The materials for study were usually allowed to remain some time in absolute alcohol, and the preparations were compared with others derived from fresh tissues. In the following necessarily brief notice we shall confine ourselves, for the most part, to some details relating to the origin of the Coniferous embryo, and to the various phases of division in the cells of *Spirogyra orthospira.*

The oosphere, or central cell of the corpusculum (*ei* (egg) of Strasburger) of *Ephedra altissima* contains, just before fertilisation, granular protoplasm at its (organic) upper part, and frothy protoplasm below; near the boundary between these is seen the nucleus; and the canal-cell, itself resulting from anterior division of the nucleus, is found at the further extremity of the frothy protoplasm (fig. 1). The end of the pollen-tube applies itself to the disarranged opercular cells (fig. 2). The nucleus now disappears, and the protoplasm becomes condensed in certain places, which are often arranged parallel to the longitudinal axis of the corpusculum (fig. 2*). Round each of these condensations, which, at first homogeneous, soon show differentiation into a nucleus

containing a highly refringent nucleolus, is formed a transparent zone marked with radiating striæ; on the outer border of this zone appear a number of dark points which mark the position of the quickly-formed cell-wall. Each corpusculum produces from 3 to 8 of these free cells; they each develope a lateral outgrowth which penetrates into the endosperm and divides at its extremity, and it is this terminal cell which gives origin to the first foundation of the embryo (fig. 3).

In *Ginkgo biloba* disappearance of the nucleus of the oosphere is followed by the formation, by protoplasmic condensation, of more than 30 new nuclei. Round each of these a cell-wall is formed as in *Ephedra*, and the whole mass of cells unites to give origin to a single embryo.

Absorption of the nucleus in the oosphere of *Picea vulgaris* (fig. 4) is usually followed by the simultaneous appearance of 4 new nuclei at its organic apex (structural base). Soon after this other nuclei are seen at the apex, provided at their equator with an interrupted band (nucleus-band, *Kernplatte*) composed of rod-like condensations of protoplasm (fig. 5, left side). The rest of the nucleus shows a number of striæ converging from the equatorial band towards the poles. The nucleus band soon divides, and the two series of rods and striæ move in opposite directions (fig. 5, right side), the separated halves of the band remaining united by means of fine threads. While the substance composing the two halves of the nucleus is condensing at its poles, a row of rod-like swellings appears in the centre of the threads uniting the two separated portions of the nucleus-band; this we shall call the cell-band (*Zellplatte*). A new nucleus is formed from each polar condensation, and the cell-band becomes divided so that each division forms the protoplasmic wall of a new cell (fig. 6). It only remains now for cellulose to be secreted on these walls, and the new cells are complete. By a similar process there are formed three series of cells in the oosphere of *Picea*.

It was found, in working with *Spirogyra orthospira*, that division could be delayed until morning, by submitting the specimens to a lower temperature. When division is about to occur the nucleus (fig. 7) begins to enlarge, and its nucleolus disappears; the equator of the latter is then seen to be provided with an interrupted band (nucleus-band) formed of small rods like those we have already seen in *Picea* (fig. 8). Currents of protoplasm containing starch-grains circulate on the border of the chlorophyll-bands, and sometimes outside them, and about three-quarters of an hour after the first change in the nucleus, a ring of protoplasm is found to extend round the cell, towards which ring the starch-grains proceed in great numbers. It is on this ring that the first deposit of cellulose takes place at the expense of the starch-grains. Meanwhile, the nucleus has become barrel-shaped, and a mass of granular protoplasm has collected at each of its poles. The nucleus-band begins to divide a quarter of an hour after its first appearance (fig. 9); all this time the nucleus has been gradually increasing in size, and at this period it shows some activity, poising itself now in one direction and now in another. Seven minutes after commencement of division in the nucleus-band, by which time the nucleus has attained one-and-a-half times its original size, the walls of the latter

are seen to be formed of several threads, whose position of insertion is between the polar condensations of protoplasm and the two new nuclei forming from the separated portions of the nucleus-band (fig. 10), while the threads originally uniting these latter (fig. 9) merge into a mass of protoplasm in the centre of the barrel-like mother-nucleus. Each of the two disk-like new nuclei travels towards one of the poles of the mother-nucleus, and unites when there with the polar condensation: the central collection of protoplasm becomes diffused over the parietal threads, after showing a faint tendency to aggregation in a direction parallel to that taken by the nucleus-band (fig. 10). Owing to expansion of the barrel-like mother-nucleus, the parietal threads constantly become more and more separated from one another, until they at last approach the layer of chlorophyll, raised, but not yet pierced by the forming septum, and they enter into communication with the protoplasm lining this layer about two hours after the commencement of division (fig. 11). Meanwhile the homogeneous new nuclei have swollen and produced from two to four nucleoli, all of which are absorbed except one. The work is now almost finished: it only remains for the young septum, buried in the original plasmatic ring, and growing at the expense of starch-grains brought by currents of protoplasm, to pierce the band of chlorophyll and become complete in the centre, and for the polar condensations to be evenly diffused over the new nuclei. Finally, the latter slowly assume a median position in their respective cells.

The endosperm-cells of *Phaseolus multiflorus* are formed freely in the embryo-sac by a process essentially similar to what we have seen in the corpusculum of *Ephedra*, and Prof. Strasburger has ascertained, by aid of reagents, that it is only when the cells have become sufficiently large to touch each other, that they are provided with a cellulose wall. In the formation of the stomatal guard-cells of *Iris pumila* the nucleus of the mother-cell shows a nucleus-band, and is marked with striæ converging towards its poles; this band divides, and the two portions condense at the opposite poles, by which means two new nuclei are produced: the wall of partition is secreted on a cell-band which appears in the position formerly occupied by the undivided nucleus-band; but if the expanding nucleus does not reach the walls of its cell, the outside protoplasm is brought into use in the completion of the septum. Examination of many cases shows that this is the ordinary method of division, and it becomes necessary, on evolutionary grounds, to consider all other processes as derived from it. *Spirogyra* affords an instance of the new septum growing from the wall of the dividing cell, and of the coincident early disappearance of the cell-band; from this we are led to the method of division which holds with *Cladophora*, where the nucleus is completely abortive. Moreover, it is well-known that in a few rare cases the nucleus of the mother-cell takes no part in division, the new nuclei being formed by condensations of protoplasm in the dividing cell: this is regarded as an instance of the nucleus having lost its power of segmentation, but of the incapacity of the cell for division without the formation of central masses of attraction. In one sense, therefore, this last method must be looked upon as intermediate between the ordinary process and that which obtains with *Spirogyra*. Prof. Strasburger goes on to the

important generalisation that free-cell formation has itself been derived from cell-division by curtailment of the various processes contingent on the latter. Where the free-formed new cells preserve the position they would occupy if produced by division, a less differentiated type is presented than where they occupy no stated position with respect to each other. The most profound modification is, he thinks, met with in the angiospermous embryo-sac, where free formation (of the embryo-vesicle) occurs without disappearance of the nucleus.

It is impossible to enter into further detail here. There cannot be two opinions about the great importance of the work, and if it be found that the tissues have not been modified by the action of the preservative fluid, it will probably make an epoch in microscopic anatomy.

In the zoospores of *Vaucheria sessilis* examined by aid of osmic acid, the granular protoplasm is found to be bounded externally by an egranulate layer (Hautschicht), with transverse rod-like markings, of which latter the cilia are continuations (fig 12). The plasmodium of *Æthalium* in the act of contraction shows a number of cilia-like prolongations of the "Hautschicht" (fig. 13). Prof. Strasburger thinks that the "Hautschicht," which may or may not be present (in the latter case the granular plasma is usually invested with the simple bounding layer of fluids), is not merely the egranulate ground-substance of protoplasm, but rather a modification of that substance endowed with a number of peculiar properties, and acting chiefly as protector and delimitator of the protoplasm. Different states of protoplasmic molecular aggregation are shown by dividing and free-forming cells; other states are found in the reproductive organs of some vascular Cryptogamia, in the sporangiæ of Myxomycetes, and in crystalloids.

Prof. Strasburger compares the streams of protoplasm inside cells (*e g.*, those of *Spirogyra*) with rhizopodous extension and amœboid movement. Mr. F. Darwin's recent discovery of protoplasmic extension from cells would appear to confirm the soundness of this comparison.*

For the purposes of this notice we have used the French translation, which had the advantage of the author's supervision. We notice that a second edition of the German work has appeared; this we have not yet seen, but should it prove different from its predecessor on any essential point we shall inform our readers.

We have reproduced in the accompanying plate some of Dr. Strasburger's illustrative figures.

EXPLANATION OF TAB. 188.

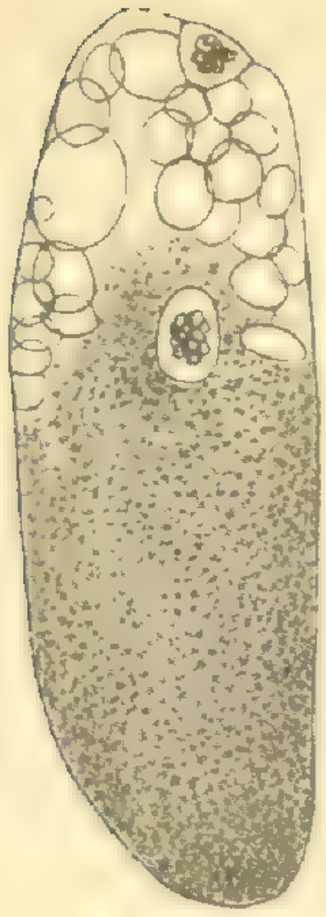
Fig. 1.—Ripe "egg" or central cell of the archegonium (corpusculum) of *Ephedra altissima*, containing frothy protoplasm at its "upper" part, granular protoplasm in its "lower" three-fourths, the nucleus near the boundary between the granular and frothy protoplasm, and the canal-cell, resulting from division of the nucleus, at the apex (structural base). × 100.

Fig. 2.—The same. Pollen-tube applied to the disarranged cells forming the mouth of the archegonium. Nucleus not yet dissolved. × 100.

Fig. 2*.—The same. A further stage, showing the nucleus dissolved, and three granular aggregations in the longitudinal axis. × 100.

Fig. 3.—The same. Free-formed cells, the nuclei of which first appear in

* Abstract in Quart. Journ. of Micros. Sc., April, 1877; in the same number Mr. Vines gives an account, in some detail, of the "Studien."



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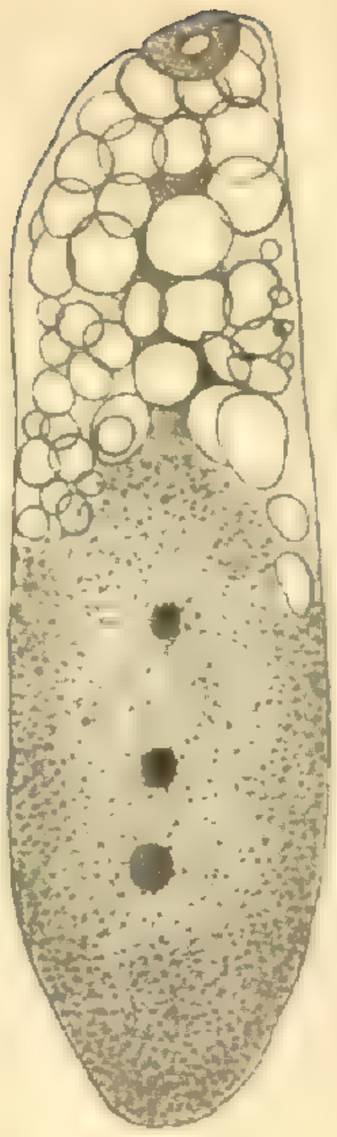

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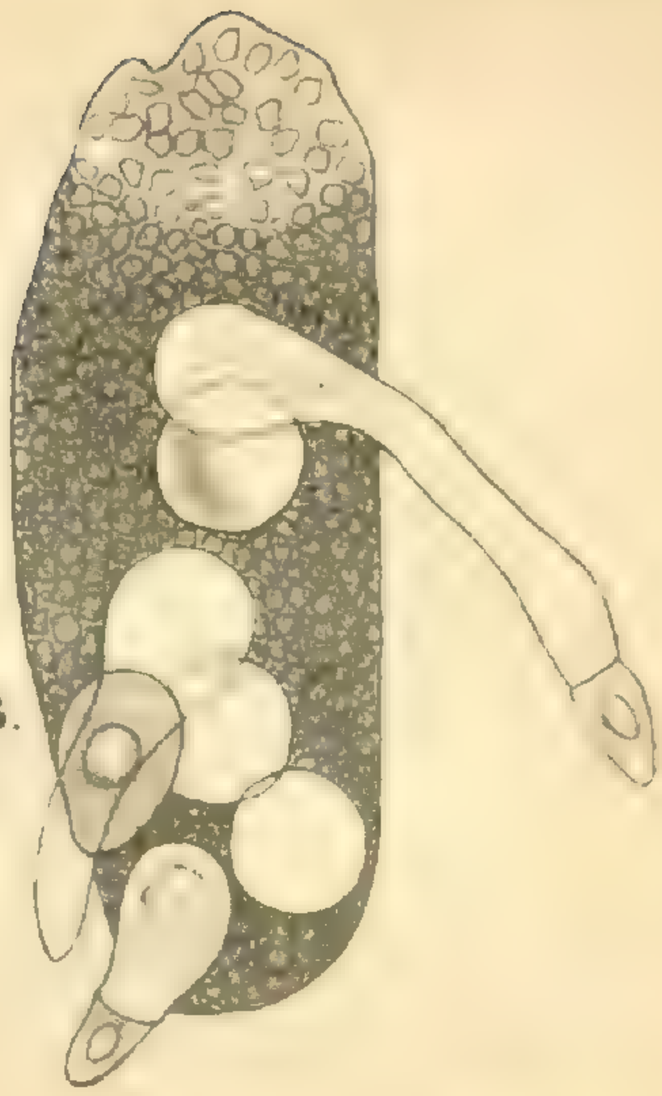

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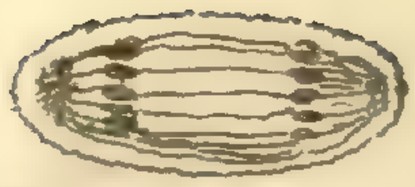

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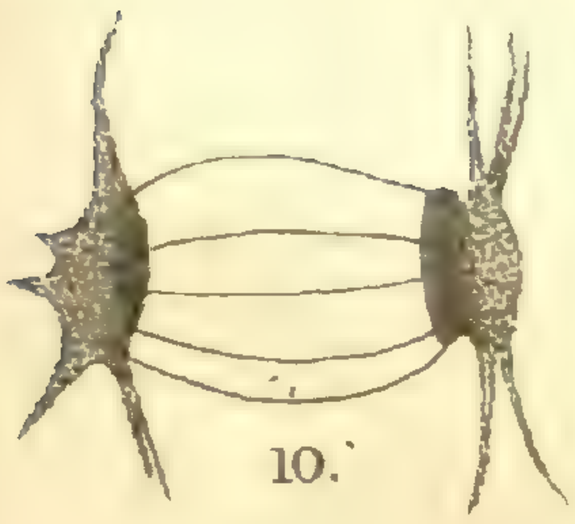

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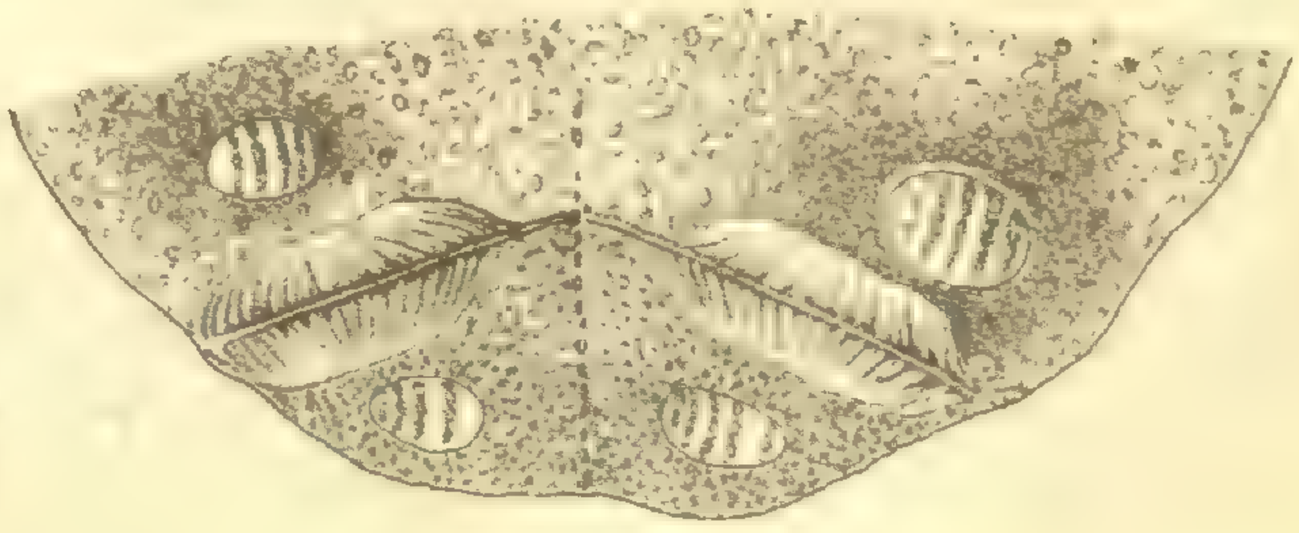

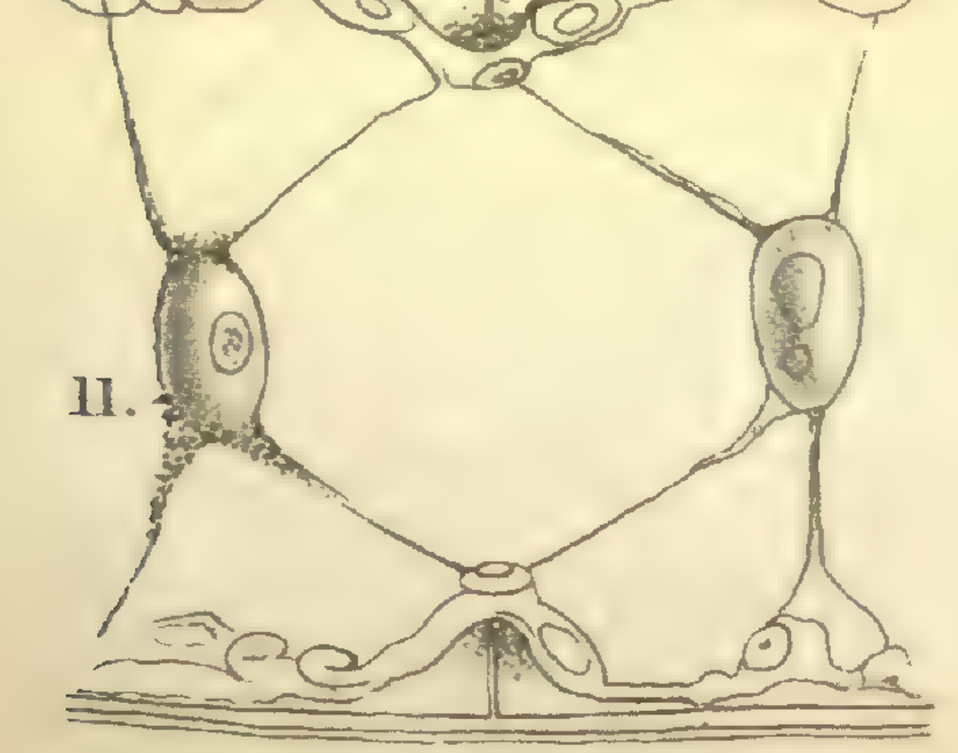

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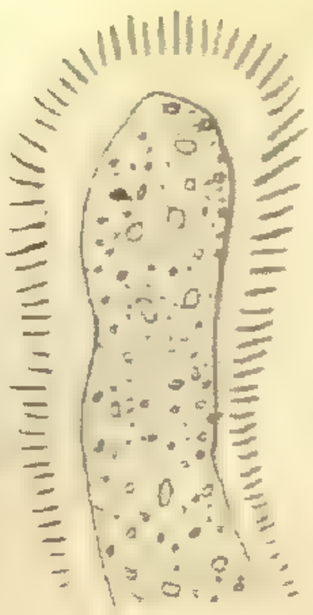

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Strasburger del. Blair lith.

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the form of aggregations as shown in the last figure, penetrating into the endosperm and already becoming divided. × 100.

Fig. 4.—Longitudinal section of an "egg" of *Picea vulgaris*, showing the dissolving nucleus with radiate disposition of the surrounding protoplasm. × 100.

Fig. 5.—The same "apical" nuclei in course of division: on the left the "nucleus-band" is still entire. × 250.

Fig. 6.—The same. Nuclei completely divided, and a cellulose wall secreted on the "cell-band." × 250.

Fig. 7, 8, 9.—Different phases of the nucleus in *Spirogyra orthospira*: 7, just before commencement of division; 8, nucleus quadrilateral with well-defined "nucleus-band"; 9, nucleus-band separated and nucleus elongated parallel to the longitudinal axis of the cell; at each pole of the mother-nucleus is seen a collection of protoplasm.

Fig. 10.—*Spirogyra orthospira.* Mother-nucleus become barrel-shaped, only a few exterior threads uniting the young nuclei persisting; the latter have assumed a lenticular figure, and border each its polar aggregation of protoplasm.

Fig. 11.—The barrel-shaped mother-nucleus has entered into communication with the layer of protoplasm lining the chlorophyll-band, the latter having been raised (but not yet sundered) by the growing septum. The newly-formed nuclei are now practically independent, and the rest of the septum is quickly formed. All the figures of *Spirogyra* magnified 600 times.

Fig. 12.—Portion of zoospore of *Vaucheria sessilis*, acted on by osmic acid, showing the protoplasmic investing layer (Hautschicht), with transverse rods continuous with the cilia; these rods are bounded at each side by the fine plasma-layer. × 600.

Fig. 13.—Plasmodial branch of *Æthalium septicum*, in process of being drawn in; here the thicker portions of the "Hautschicht" remain behind in the form of cilia-like prelongations. × 600.

S. M.

On the Genetic Connection between Mosses, Vascular Cryptogams, and Phanerogams.

Ueber den genetischen Zusammenhang der Moose mit den Gefässkryptogamen und Phanerogamen. Von Dr. F. Kienitz-Gerloff. ("Botanische Zeitung," Nov., 1876.)

In *Riccia*, *Marchantia*, *Preissia*, the hitherto-examined Ferns, the *Rhizocarpeæ*, and probably also the *Equisetaceæ*, the first septum appearing in the oosphere is inclined to the axis of the archegonium; whilst it is perpendicular to that axis in *Sphærocarpus*, the *Jungermanniæ*, *Lycopodiaceæ*, and *Phanerogamia*. As a rule, the members of the first set grow by a terminal cell, which in those of the second set is either entirely absent or functionally active only for a short time. In *Riccia* and *Marchantia* the first septum lies nearly perpendicular to the axis of the archegonium, and it is nearly parallel in Ferns and *Rhizocarpeæ*. Moreover, the development of the seta in *Jungermanniæ* answers closely to that of the suspensor of *Selaginella* and *Phanerogamia*, but takes place in a precisely opposite direction. We obtain, then, a complete series starting from the perpendicular first septum of the oosphere *above* which the special reproductive elements are produced, through forms with an inclined first septum, to others provided with a suspensor *below* which the reproductive elements take origin. It appears therefore that the embryo has suffered a complete revolution. While pointing out these analogies, however, the author does not wish to lay much phylogenetic stress upon them; he is far from

thinking that only Ferns and *Rhizocarpeæ* are derived directly from *Marchantiæ*, and *Selaginella* and *Phanerogams* from *Jungermanniæ*.

S. M.

Reproduction of Ulotherix zonata.

Ulothrix zonata, ihre geschlechtliche und ungeschlechtliche Fortpflanzung, ein Beitrag zur Kenntniss der untern Grenze des pflanzlichen Sexuallebens. Von Dr. Arnold Dodel. (Pringsheim's Jahrbucher für Wissenschaft Botanik, vol. x., pp. 417-550, tab. xxxi-xxxviii.)

Ulothrix zonata has spores of two kinds—viz., 4-ciliated macrozoospores produced either singly or two together in the mother-cell, and 2-ciliated microzoospores arising several together in each mother-cell. Sometimes the two spore-forms are found in neighbouring cells of a thread, but they usually have distinct periods of activity, autumn and winter being favourable to the formation of macrozoospores, and spring and summer to that of microzoospores. The latter copulate and form resting zygozoospores, a fact which sets Areschoug's* position beyond cavil; but the strangest thing of all is that those individuals which fail to copulate are like the macrozoospores in having the power of immediate asexual reproduction. This most remarkable observation, which its discoverer regards as furnishing a transition-state between sexual and asexual generation, comes to some extent to the timely support of the Strassburg school, who deny that the fact of germination is sufficient proof of the asexuality of spermatia. Several figures are given showing polymorphism of the threads and of the zoospores; between the two forms of the latter there are all kinds of transition, the only absolute distinction being based on the number of cilia. Further, it has long been known that microzoospores sometimes germinate while still in the mother-cell, and Dr. Dodel has seen some of them degenerate in this position without budding. Dr. Dodel agrees with Pringsheim that copulation of microzoospores is the morphological type of sexual reproduction. As for the zygozoospore, which, germinating after its period of rest, produces, not a thread of cells but a variable number of zoospores from which the threads arise, it is regarded as an independent new sexual generation, so that we have in *Ulothrix* true alternation of generation. Dr. Dodel points out the affinity of *Ulotrichea* to *Volvocineæ* and *Hydrodictyeæ*, but he is too prudent to dogmatise on the subject of classification. He holds, however, that the facts he has discovered afford strong support to the theory of evolution, as they show how (morphologically, of course) an asexual cell may become endowed with sexual properties. S. M.

Development of the Flower of Brugmansia and Aristolochia.

Die Entwickelung der Blüthe bei Brugmansia Zippelii und Aristolochia Clematitis. Von H. Grafen zu Solms-Laubach. ("Botanische Zeitung," July and August, 1876.)

This is another of Count Solms' contributions to the life-history of

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* "Observationes Phycologicæ. Particula secunda de *Urospora mirabili* Aresh. et de chlorozoosporarum copulatione" (Upsaliæ, 1874), also "de copulatione Microzoosporarum *Enteromorphæ compressæ*," Bot. Notiser, 1876.

Rhizogens. The thallus of *Brugmansia* first appears in the form of pale yellow spots easily distinguishable from the red-brown tissues of the host: under a higher power, it appears usually in the form of irregularly-shaped masses inserted in the cambium, and continued on one side into the bark, and on the other into the young wood or medullary rays; these masses are composed of numerous large cells in the disposition of which no order is observed. Sometimes the thallus lies completely in the wood, under which circumstances its growth is stopped. The growth of the "floral cushion" (*Floralpolster*), as the author terms the plant in the early state, keeps pace with the increase in thickness of the fostering Cissus-root. It destroys the neighbouring part of the cambium-zone by its enlargement, and becomes shaped like a top or a double cone. Up to this time the tissues have remained undifferentiated; but soon the formation of permanent tissue is indicated by widening and lengthening of the cells in the lower part of the cushion, the cells of the upper part being still filled with protoplasm. It is next seen that development of vessels is in progress in the lower portion of the cushion, and inter-spaces are found in the young tissues. At this period more vigorous growth is exhibited by the surrounding tissues of the host, the bark actually increasing in thickness over the parasite. The meristem of the flower-shoot is now situated in the lower part of the tissue separating the interspaces, and from it the scale-like leaves are developed, of which there are three pentamerous alternating whorls. After a time the tip also of the growing plant is in the meristematic condition, and in this the fibro-vascular bundles terminate. The perigone next appears as a circular rim surrounding the vegetative point, but owing to limited space the finger-shaped lobes are pushed out of a typical position. Soon a fibro-vascular bundle is found in the tips of the perigonial lobes, constantly increasing in size and arching over the extremity of the axis; the perigonial fibro-vascular bundles afterwards become united with those of the axis. Meanwhile, in the inner part of the apical meristem, intercellular spaces have been formed, and the androœceum has appeared, separated by a shallow furrow from the vegetative point. Soon after the appearance of the floral parts, the parasite escapes from the investment of the host. The inter-meristematic spaces become enlarged, and in the plates of intervening tissue fibro-vascular bundles are developing. Afterwards the perigone frees itself from the enclosure of the scaly leaves, and the columnar androœceum growing by means of meristem lying close under the anther-crown, in turn disengages itself from the perigone. After this the circular stigma is formed on the androœcial column, and the ovules, uninvested by placentary tissue, take origin from the septa between the interspaces already alluded to.

Cleistogamous and male flowers were also found. The latter have a thinner flower-shoot than the hermaphrodite ones, and their inter-spaces show no tendency to enlarge for the support of ovules.

Count Solms holds that *Rafflesiæ* differ from all related forms by reason of the peculiarity that the flower-shoot, after formation of a single whorl of sexual leaves, produces the ovary through internal differentiation in the tissues of its growing-point. He challenges the universality of Cienkowsky's dictum that all ovules are borne by a

carpellary leaf, for in this case we find ovules developing in intercellular cavities. But we venture to think that this exception, occurring as it does in association with such extraordinary conditions of growth, only strengthens Cienkowsky's position.

In the case of *Aristolochia*, Count Solms thinks that the single whorl of sexual leaves produces pollen above and ovules below.

S. M.

Botanical News.

Articles in Journals.—March.

Grevillea.—M. C. Cooke, "Cocoa-Palm Fungi" (tab. 86).—Id., "New British Fungi" (contd.)—Id., "On *Heterosporium.*"—Id., "On *Valsa Vitis.*"—Id. and J. B. Ellis, "New-Jersey Fungi" (contd.). J. M. Crombie, "New British Lichens."—Id., "British species of *Pterygium.*"—Id., "On the genus *Ephebe.*"—J. E. Vize, "Californian Fungi."—W. Phillips, "Fungi of California and the Sierra Nevada Mts." (tab. 87).

Botanische Zeitung.—L. Celakovsky, "Phyllody of the ovules in *Trifolium repens.*"—R. Caspary, "On the protective sheath."—Id., "*Nymphæa zanzibariensis*, n.sp."

Flora.—F. Buchenau, "Dehiscence of the capsule in German species of *Juncus*" (contd.).—A. Batalin, "Mechanism of movements in insect-eating plants" (contd.).—E. Stahl, "On the importance of the hymenial gonidia."—H. G. Holle, "On the activity of assimilation in *Strelitzia Reginæ.*"—C. Kraus, "Mechanism of tuber-formation."

Hedwigia.—F. Kornicke, "Mycological notes" (contd.).—N. Sorokin, "Cryptogamic Flora of the Ural district."

Oesterr. Bot. Zeitschr.—L. Celakovsky, "Botanical notes, chiefly on flora of Bohemia."—V. von Janka, "On 2 species of *Cardamine.*"—F. Hazslinszky, "A new Myxogastric type."—F. von Thuemen, "*Phyllosticta Vossii*, n.s."—A. Kerner, "Distribution of Hungarian plants" (contd.).—J. Kugy, "Botanical excursion to S. Croatian Mountains."—F. Antoine, "Botany of Vienna Exhibition" (contd.).

Magyar Növénytanilapok.—A. Kerner, "On what soils does the Chestnut grow in Hungary?"—V. von Janka, "On species of *Cardamine.*"—J. von Csato, "On Flora of Nagy-enyed" (contd.).

Bull. Bot. Soc. France (1876, pt. 3, "Session Mycologique")—Boudier, "Note on the ink of *Coprinus.*"—Id., "Fungi of Montmorency."—Id., "On *Boletus reticulatus.*"—Id., "Description of *Cortinarius erinaceus*, Fr."—N. Patouillard, "On the preservation for study of Fungi."—N. Magnin, "New species of *Orbicula.*"—Ripart, "*Peziza Clissoni*, n.sp."—L. Quélet, "Poisonous and edible Fungi of East of France."—Id., "New species in Jura and Vosges" (tab. 2, 3).—Id., "Descriptions of interesting species in neighbourhood of

Paris."—C. Kalchbrenner, "Notes on his 'Icones Hym. Hungariæ.'" —M. Cornu, "Fungi collected in the woods of Chaville."—R. Magnin, "Pycnidia of *Sphærotheca*."

(1876, pt. 4).—M. Cornu, "Note on *Ptychogaster albus*, Corda." —Id., "Notes on Cryptogams collected in environs of Isle-Adam." —E. van Tieghem, "New observations on the development of the perithecium of *Chætonium*."—A. Loche, "Note on the cleistogamous flowers of *Balsamineæ*."—De Brutellette, "On *Obione pedunculata* at S. Valéry-sur-Somme."—P. Petit, "Attempt at a classification of the *Diatomaceæ*."—L. Brisout de Barneville, "Rare plants near S. Germain-en-Laye."—De Seynes, "New species of *Lepiota*, and on character of the section *Calodontes* of *Mycena*."—Emery, "Influence of age on the composition of leaves."—V. Payot, "Florula of the Valley of the Diozaz."—A. Godron, "An additional chapter to the history of the hybrid *Ægilops*."—Chaboisseau, "Notes on rare or curious botanical works."

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New Books.—V. Cesati, "Felci e specie nei gruppi affini raccolte a Borneo dal Sig. O. Beccari" (4 tab. Naples. 1876).—O. Heer, "Flora fossilis arctica." Band iv. (65 tab. Zurich. 1877.)—F. von Mueller, "Select Plants suitable for cultivation in Victoria" (revised edition). (Melbourne. 1876.)—J. Weisner, "Die Entstehung der Chlorophylls in der Pflanze." (Vienna. 1877.)—H. J. Elwes, "Monograph of the genus *Lilium*." Part I. (Fol. 8 col. plates 30s.)—H. Loret and A. Barrandon, "Flore de Montpellier." 2 vols. (Paris and Montpellier. 12fr.)

In the "Monatsbericht" of the Berlin Academy of Sciences for December last, A. Braun gives a very full account of *Encephalartos Hudebrandtii*, A. Br. & Bouche, brought from Zanzibar by the traveller after whom it is named in 1873, and cultivated in the Berlin Garden. In the same paper are described *Crinum Hildebrandtii*, Vatke, n.sp., from the Comoro Islands, also cultivated at Berlin; and *Cladostemon*, A. Br. & Vatke, a new genus of *Capparideæ* from Zanzibar (*C. paradoxus*). There is also a fuller account of the genus *Hildebrandtia*, to which reference has been already made in these pages.

The Report of the "Marlborough College Natural History Society" for 1876 contains the fourth and concluding part of the Rev. T. A. Preston's revised "Flora of Marlborough." The author wishes to reprint it with further additions and corrections, if a sufficient number of subscribers (it is hoped that the price will not exceed 5s.) can be obtained. Address Rev. T. A. Preston, the College, Marlborough.

In the 86th part of Baron von Mueller's "Fragmenta," a new genus of Menispermaceæ, *Fawcettiaæ*, from Richmond River, E. Australia, is described.

Dr. Uhlworm proposes to continue the invaluable "Nomenclator Botanicus" of Dr. Pfeiffer. That work goes to the end of 1858, and it is now intended to bring the record down to the end of 1876. In this continuation will be also included species, sub-species, and varieties,

and it will be divided into 6 sections (3 Phanerogamic and 3 Cryptogamic), each arranged alphabetically. Fischer, of Cassel, is the publisher, and the work will appear in monthly parts at 4m. 50pf. each.

Dr. A. Engler, of Munich, who undertakes for Just's "Jahresbericht" the morphology and systematic report on Phanerogams and their geographical distribution, requests authors on these subjects to be so good as to send to him separate copies of their memoirs as quickly as possible, in order that they may be included, since the publications of societies and academies frequently do not reach Germany till long after date. In return he offers equivalent copies of his own publications.

Prof. Schwendener, of Basel, has succeeded Hofmeister at Tübingen, and the chair at Basel is filled by Prof. Pfeffer, from Bonn.

The prize of 500 francs founded by Aug. P. de Candolle for the best original monograph of a genus or family of plants, is offered for competition by the Société de physique et d'histoire naturelle de Genève. The MSS., which may be written in Latin, French, German, English, or Italian, should be addressed before 1st October, 1879, to M. le Prof. Marignac, Corresponding Secretary to the Society, at Geneva.

Dr. Theodor M. Fries has been appointed Professor of Botany and Practical Economy in the University of Upsala.

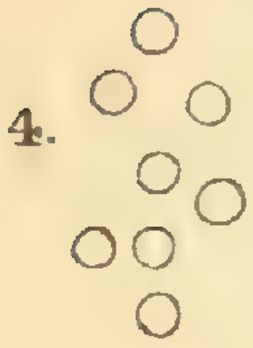
Dr. James W. H. Trail has obtained the Chair of Botany in the University of Aberdeen.

Dr. Alexander Braun, for twenty-six years Director of the Botanic Gardens and Professor of Botany in the University, died at Berlin on 29th March, after eight days' severe suffering, in his 72nd year. It is our expectation to give soon an obituary notice of this eminent botanist, from the pen of Prof. Caspary, of Koenigsberg.

The deaths are also announced of A. Bellynck, Professor in the College of Namur; of E. Bourgeau, the well-known botanical collector; of T. Lestiboudois, æt. 80, formerly professor in the University of Lille, where he succeeded his father and grandfather, and the author of numerous papers on structural and systematic botany; also of Dr. B. A Gomes, of Lisbon.

A botanical congress has been held in connection with the International Horticultural Exhibition at Amsterdam. It was numerously attended, but few English botanists were present. Prince Henry of the Netherlands opened the session, and Prof. Rauwenhoff, of Utrecht, read the opening address. Papers were read by MM. Weddell, Ascherson, Engler, Radlkofer, and Morren, and various excursions were made to the museums and horticultural establishments of Holland, the North Sea canal, and other places.

It has been resolved to hold a Congress of Botany and Horticulture at Paris in 1878, from 16th to 22nd August, during the opening of the International Exhibition, and an influential committee of the leading botanists and horticulturists of France has been already formed for its organisation. English botanists who intend to be present should communicate with the President of the Committee, M. Lavallée, 84, Rue de Grenelle-Saint-Germain, Paris.



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Xerotus sanguineus, *W.G. Smith.*

Original Articles.

A NEW SPECIES OF XEROTUS.

By W. G. Smith, F.L.S.

(Tab. 187.)

Xerotus sanguineus, *sp. nov.*—*Pileus* coriaceo-membranaceous, dry, hygrophanous, extremely thin, campanulate, depressed, radiato-sulcate and lacunose within and without near attachment of stem; margin widely dentate. *Stem* rigid, hollow, compressed, black without, striate and furfuraceous, lined within with a yellowish-white membrane. *Hymenophorum* continuous with the stem. *Gills* reduced to a few very distant, dichotomous, almost obsolete folds. *Spores* white, round, very small, ·0001 inch in diameter.

This remarkable species of a very rare genus was collected by Mr. Shuttleworth, Mr. Bull's collector, on stumps and on the ground in the State of Santander, United States of Columbia, S. America, at an elevation of 5-6000 ft., the temperature being 55° F. The whole plant revives with moisture; it is tasteless.

NEW FERNS FROM THE ANDES OF QUITO.

By J. G. Baker, F.L.S.

I have lately been engaged in the study of a fine collection of Ferns gathered in the Andes of Quito by Father P. L. Sodiro. Although the district has been so extensively searched already, yet this collection contains a considerable number of new species. It includes altogether about 300 species, of which the following are either new or imperfectly known and not admitted as distinct in the "Synopsis Filicum," or in the case of those which I have not described are very rare species or new to Ecuador. The numbers prefixed to the names indicate the position of the plants in the sequence of "Synopsis Filicum."

15*. Hemitelia firma, *Baker*, n.sp.—Frond ample, tripinnatifid; rachises castaneous, neither scaly nor prickly, densely pilose on the upper surface, glabrous and glossy beneath. Pinnæ oblong-lanceolate, $1\frac{1}{2}$-2 feet long, 6-8 inches broad. Pinnules lanceolate, subsessile, articulated at the base, 3-4 inches long, $\frac{5}{8}$-$\frac{3}{4}$ inch broad, cut down to a distinct wing into close lanceolate denticulate obliquely acute segments $\frac{1}{8}$ inch broad. Texture subcoriaceous; both surfaces green and glabrous. Veins 9-10-jugate in the tertiary segments, distinct, all except the uppermost deeply forked. Sori small, crowded, costular. Involucre obscure, minute. Allied to *H. Lindigii*, Baker;

different in texture, colour of the rachis, costular sori, and more numerous veins.

18*. Dicksonia Sprucei, *Baker*.—Rhizome creeping. Stipe stout, a foot or more long, dull brown, rugose, clothed throughout with minute linear palæ. Frond oblong-deltoid, several feet long, 1½-2 feet broad, bipinnate or tripinnatifid; rachis pale brown, rugose, and minutely scaly. Pinnæ oblong-lanceolate, the lower ones a foot or more long, 4-5 inches broad, the lowest pair reflexed and dwarfed. Pinnules lanceolate, broadly adnate at the base, 2-2½ inches long, ⅝-¾ inch broad, acute, entire or cut into short broad obtuse lobes. Texture moderately firm; both surfaces bright green, glabrous, except on the midrib beneath. Veins pinnate in the tertiary segments, with fine distinct arcuate-ascending veinlets. Sori placed round the margin of the tertiary lobes. Involucre a shallow marginal cup, twice as broad as deep, not distinctly two-lipped. Dennstædtia Sprucei, *Moore Ind. Fil.* ii., 308. Gathered also by Spruce (No. 5350) in the Andes of Ecuador. "Filix 12-18-pedalis, vel plane volubilis, vel inter arbuscularum ramos scandens," Spruce. Allied to *D. adiantoides*, H.B.K.

18*. Dicksonia vagans, *Baker*, n.sp.—Rhizome wide-scandent. Stipes remote, under a foot long, dull brown, clothed only with a few minute linear deciduous scales. Frond oblong-deltoid, 2-3 feet long, a foot broad, bipinnate; rachises dull brown, obscurely furfuraceous. Pinnæ lanceolate, sessile, 5-6 inches long, 1-1½ inch broad, the largest cut down to the rachis, the central ones to a narrow wing into oblong obtuse pinnules ¼ inch broad, adnate by their whole breadth to the rachis and inciso-crenate at the tip. Texture membranous; both surfaces green and glabrous. Veins copiously pinnate in the pinnules, with erecto-patent distinct veinlets, all except the uppermost forked. Sori small, placed between the teeth of the secondary segments. Outer valve of the involucre the largest, recurved; inner valve smaller, hidden beneath the sorus.

18*. Dicksonia scandens, *Baker*, n.sp.—Rhizome wide-scandent. Stipes remote, under a foot long, dull brown, naked. Frond subdeltoid, tripinnatifid, about 3 feet long by 2 feet broad; rachises dull brown, obscurely furfuraceous. Pinnæ lanceolate, the central ones 9-12 inches long, 2-3 inches broad, the lowest pair much dwarfed. Pinnules sessile, lanceolate, the most developed not at all adnate to the rachis, acute or obtuse, 15-18 lines long, under ½ inch broad, with deep close oblong-quadrate ascending lobes. Texture moderately firm; both surfaces dull dark green and glabrous. Sori placed at the base of the sinuses between the tertiary lobes. Involucre glabrous, ¼-⅓ line broad, not distinctly 2-lipped, the outer half rolled over the sorus, the inner half hidden beneath it. This and the last two differ much in cutting, but are in all other points very near to one another. They are wide-scandent, growing on trees, and connect *Dennstædtia* with *Hypolepis*.

Pellæa intramarginalis, *J. Smith*.—Known before in Mexico and Guatemala.

Adiantum Moorei, *Baker*.—Known already only in Peru.

Pteris Fraseri, *Metten*.—Gathered previously by Fraser and Spruce.

25*. Asplenium *(Euasplenium)* holophlebium, *Baker*.—Rhizome wide-creeping, very slender. Stipes naked, green, remote, $\frac{1}{8}$-$\frac{1}{2}$ inch long. Frond lanceolate, simply pinnate, not produced and radicant at the tip, $\frac{3}{4}$-$1\frac{1}{4}$ inch long, 3-4 lines broad. Pinnæ 10-15-jugate, oblong-rhomboid, attached by a short petiole at the lower corner, $1\frac{1}{2}$-2 lines long, pointed at the upper outer corner, furnished with only a midrib, which is nearer the lower than the upper margin, and stops considerably short of the tip; branch veinlets none. Texture very membranous; both surfaces bright green and glabrous. Sorus solitary, running from near the base two-thirds of the way up the pinnæ. Involucre broad, persistent. A very distinct delicate little plant, investing the stems of a *Melastomacea*, probably a *Miconia*. It comes nearest the little-known Peruvian *A. projectum*, Kunze.

Asplenium lunulatum, var. A. Macræi, *H. et G.*—Exactly matching the Sandwich Island type.

Asplenium Hallii, *Hook.*—Gathered previously by Col. Hall in Ecuador, and by Spruce in the Amazon Valley.

Asplenium *(Diplazium)* pulicosum, *Hook.*—Much more satisfactory specimens than those of Jameson, on which the plant was named and described. The general habit is completely that of *A. radicans*, Schk.

271*. Asplenium *(Anisogonium)* hemionitideum, *Baker*, n.sp.—Stipe about a foot long, stout, stiff, dull brown, nearly naked, not muricated. Frond oblong-deltoid, simply pinnate, 3-4 feet long, $1\frac{1}{2}$-2 feet broad; rachis dull brown, nearly naked. Lower pinnæ sessile, oblong-lanceolate, entire, acute, rounded on both sides at the base, 8-10 inches long, 2-3 inches broad. Texture chartaceous; both surfaces green and glabrous. Veins in groups $\frac{1}{4}$-$\frac{1}{3}$ inch broad, of 5-6 very distinct veinlets each, the contiguous groups uniting about halfway between the midrib and edge, and the veinlets of the same group also anastomosing. Sori slender, running down all the veins, touching the midrib of the pinnæ, but not the margin. Involucre very narrow and obscure.

271*. Asplenium *(Anisogonium)* macrodictyon, *Baker*, n.sp.—Stipes tufted, $1\frac{1}{2}$-2 feet long, dull brown, obscurely furfuraceous. Frond oblong-deltoid, 2 feet long, simply pinnate in the lower, deeply pinnatifid in the upper half; rachis dull brown and furfuraceous, like the stipe. Pinnæ lanceolate, only the three lowest pairs not adnate, sessile, oblong-lanceolate, acute, 5-6 inches long, $1\frac{1}{2}$-2 inches broad, entire, or the lower ones shallowy broadly obtusely lobed on the lower side. Texture membranous, but firm; both surfaces dark green and glabrous, except the main veins, which are clothed with ferruginous tomentum. Veins in erecto-patent groups half an inch broad, of 8-10 veinlets each, the contiguous groups uniting so as to form merely a deltoid areole against the midrib of the pinnæ, and the veins of the same group also anastomosing. Sori slender, running down all the veins, reaching the midrib, but not the margin. This and the last fall in beside two of Dr. Spruce's discoveries on Mount Chimborazo, *Asplenium chimborazense* and *A. rivale*.

Nephrodium (*Lastrea*) sanctum, *Baker*.—New to Ecuador.

62*. Nephrodium (*Lastrea*) carazanense, *Baker*, n.sp.—Stipe a foot long, pale brown, densely pilose, clothed throughout with large

brown lanceolate scales. Frond oblong, bipinnatifid, $2\frac{1}{2}$-3 feet long, a foot broad, narrowed gradually from the middle to both ends; rachis pale, densely pilose, with a few large scattered brown scales. Pinnæ lanceolate, sessile, the central ones 5-6 inches long, an inch broad, cut down nearly or quite to the rachis into falcate entire lanceolate segments $\frac{1}{6}$ inch broad; lower pinnæ gradually dwarfed and deflexing; lower segments not dwarfed. Texture moderately firm, both surfaces green, glabrous except on the ribs beneath. Veins simple, erecto-patent, 12-15-jugate. Sori small, medial. Involucre minute, fugacious. Allied to *N. diplazioides* and *pachyrachis*.

211*. Nephrodium (*Sagenia*) Sodiroi, *Baker*, n.sp.—Rhizome short-creeping. Stipe a foot long, grey, naked, except for a few small brown lanceolate scales near the base. Frond oblong-rhomboid, simply pinnate, 1-$1\frac{1}{2}$ foot long. Pinnæ 7, oblong-lanceolate, the end one the largest, the side ones erecto-patent, sessile or short-petioled, entire, 6-10 inches long, 2-$2\frac{1}{2}$ inches broad. Texture moderately firm, both surfaces green and glabrous. Main veins arcuate-ascending, distinct to the edge, $\frac{1}{4}$-$\frac{3}{8}$ inch apart; less distinct regular cross-bars 5-6 between midrib and edge; areolæ with copious free included veinlets. Sori copious, minute, scattered irregularly, 12-15 in a line between edge and midrib. Involucre persistent, glabrous. Very near *N. polymorphum* of Tropical Asia.

19*. Polypodium (*Phegopteris*) Michaelis, *Baker*, n.sp.—Rhizome short-creeping. Stipe 12-15 inches long, dull brown, naked. Frond $1\frac{1}{2}$-2 feet long, oblong-deltoid, bipinnatifid; rachis dull brown, naked. Pinnæ lanceolate, the lowest the largest, shortly petioled, all except the two lowest pairs decurrent so as to form a deltoid wing to the main rachis, 5-6 inches long, 1-$1\frac{1}{2}$ inch broad, cut down to a broad wing into ascending lanceolate subentire secondary segments $\frac{1}{4}$-$\frac{1}{6}$ inch broad. Texture membranous; both surfaces bright green and glabrous. Veinlets 5-6-jugate in the secondary segments, distant, simple, erecto-patent. Sori round, placed below the middle of the veins. Well-marked from all the other simple-veined species by its strongly decurrent upper and central pinnæ.

57*. Polypodium (*Goniopteris*) subintegrum, *Baker*, n.sp.—Caudex erect. Stipes naked, tufted, slender, grey-green, 2-5 inches long. Frond linear-acuminate, 4-6 inches long, $\frac{1}{2}$-$\frac{5}{8}$ inch broad, with shallow obtuse lobes 2-3 lines broad, narrowed to the base. Texture chartaceous; both surfaces green, glabrous, except the main veins beneath. Veins pinnate against the primary lobes; veinlets 5-6-jugate, arcuate-ascending, simple, about three of them joining with the opposite ones of the adjoining groups at the tip. Sori small, round, subcostular. Near *P. simplicifolium*, Hook., of the Philippines and Fiji.

64*. Polypodium (*Goniopteris*) coalescens, *Baker*, n.sp.—Caudex suberect; scales dense, minute, brown, linear-subulate. Stipes tufted, brownish, half a foot long, with a few scattered lanceolate membranous scales. Frond oblong-deltoid, simply pinnate, 1-$1\frac{1}{2}$ foot long. Pinnæ sessile, lanceolate, 5-6 inches long, 1-$1\frac{1}{4}$ inch broad, acuminate, inciso-serrate; many lower pinnæ of equal size. Texture membranous; mature frond glabrous on both sides; young frond finely pubescent beneath. Main veins erecto-patent, distinct to the edge, $\frac{1}{4}$ inch apart. Veinlets 5-6 between the midrib and edge, forming

lax deltoid arches. Sori placed at the tip of the veinlets, often those of contiguous groups coalescing. Near *P. urophyllum* of Tropical Asia, but veining very different.

90*. POLYPODIUM (*Dictyopteris*) NICOTIANÆFOLIUM, *Baker*, n.sp.—Rhizome wide-creeping. Stipes 1-1½ foot long, dull brown, with a few small linear brown scales near the base. Frond oblong-deltoid, 1½-2 feet long, with a large oblong acute terminal pinna 3-5 inches broad, and 3-5 pairs of narrower more lanceolate side ones, of which only the lowest pair is not connected with the rest by a wing to the rachis; side pinnæ ascending, reaching a length of 6-8 and a breadth of 2-2½ inches, entire, narrowed to an acute or acuminate tip. Texture membranous; both surfaces green, glabrous. Main veins arcuate-ascending, distinct to the edge, ½-¾ inch apart; distinct cross-bars 6-10 between the midrib and edge; areolæ very small and copious, with abundant free included veinlets. Sori minute, scattered, about half-a-dozen in an irregular row between each main vein. Also foot of Mount Chimborazo, *Spruce*, 5723, and Chontales, *Seemann*, 230. Allied to *P. draconopterum*, Hook.

136*. POLYPODIUM (*Eupolypodium*) SUBSCABRUM, *Klotzsch*.—Caudex erect. Stipes tufted, filiform, ½-2 inches long, densely clothed with fine spreading brown hairs. Frond lanceolate, 4-6 inches long, ½ inch broad, narrowed from the middle to both ends, simply pinnate, cut down to the rachis into ligulate obtuse entire pinnæ $\frac{1}{12}$-⅛ inch broad, all contiguous and broadly adnate at the base. Texture moderately firm; both surfaces, and especially the midrib, furnished with scattered brown hairs like those of the stipe. Veins simple, erecto-patent, 3-4-jugate in the central pinnæ. Sori round, superficial, terminal on the veins, 6-8 to the central pinnæ. *Hook Sp. Fil.* iv., 183, t. 274A. Also gathered by Moritz, Jameson, Spruce, and Steere. Mentioned by name only in "Synopsis Filicum," under *P. subtile*, at page 326, from which these later specimens fully confirm its distinctness.

177*. POLYPODIUM (*Eupolypodium*) MANABYANUM, *Baker*, n.sp.—Rhizome half a line thick, firm, flexuose, wide-scandent (in one of our specimens above a foot long). naked. Stipes distant, naked, stramineous, half an inch long. Frond lanceolate, 8-12 inches long, 1-1½ inch broad, erect, cut down to the midrib into lanceolate patent acute crenulate pinnæ ½ inch broad, all contiguous and broadly adnate at the base, a few lower ones dwarfed and deflexed. Texture moderately firm; both surfaces green and glabrous, and veins distinct, simple, erecto-patent, 8-10-jugate in the largest pinnæ, not reaching more than halfway to the edge. Sori small, round, superficial, placed nearer the midrib than the margin of the pinnæ. Near *P. taxifolium*, Linn.

P. DEPENDENS, *Baker*, one of Spruce's discoveries, and also its allies, *P. alternifolium*, Hook., and *P. sericeo-lanatum*, Hook., are well represented in Father Sodiro's collection.

184*. POLYPODIUM (*Eupolypodium*) QUITENSE, *Baker*, n.sp.—Rhizome stout, creeping; basal scales not seen. Stipes bright brown, erect, finely pilose, 4-6 inches long. Frond oblong-lanceolate, simply pinnate, a foot long, 3-4 inches broad; rachis brown, densely pilose. Pinnæ lanceolate, acute, broadly adnate at the base, entire, the largest about 2 inches long, half an inch broad, the lowest pair or two pairs

rather dwarfed and separated from the rest. Texture moderately firm, both surfaces, especially the lower one, finely pubescent. Veins erecto-patent, with 2-3 short forks. Sori in a row midway between the midrib and margin of the pinnæ, immersed, oblong, oblique, as many as 20 in a row. Near the Mexican *P. Martensii*, Mett., from which it differs by its longer stipe, fewer broader pinnæ, and oblong immersed sori.

243*. POLYPODIUM (*Goniophlebium*) CHARTACEUM, *Baker*, n.sp.—Rhizome terete, woody, wide-creeping, glaucous, denudate, $\frac{1}{6}$ inch thick. Stipes 2-3 inches long, naked, glossy, rigidly erect, brown, furnished with a narrow wing. Frond lanceolate, simply pinnate, 6-9 inches long, 2-3 inches broad. Pinnæ linear, entire, all contiguous and broadly adnate at the base to the rachis, the largest 15-18 lines long, $\frac{1}{4}$-$\frac{1}{3}$ inch broad, the lowest pair deflexed, little dwarfed. Texture rigidly subcoriaceous; both surfaces green and quite glabrous. Veins very distinct and raised; areolæ in only a single row against the midrib. Sori in a single row near the midrib, small, round, superficial, 12-15 to a row in the largest pinnæ. Near *P. loriceum*, Linn.

POLYPODIUM (*Niphobolus*) AMERICANUM, *Hook.*—The only American representative of this subgenus, gathered previously by Jameson and Spruce.

9*. MENISCIUM OPACUM, *Baker*, n.sp.—Caudex and stipe not seen. Frond oblong-deltoid, simply pinnate, 2-3 feet long, a foot broad; rachis dull brown, slightly scaly. Pinnæ sessile, lanceolate, acuminate, obscurely repand, not serrated, the lower ones 6-7 inches long, 15-18 lines broad. Texture moderately firm; both surfaces green and glabrous. Main veins slightly ascending, distinct to the edge, $\frac{1}{6}$ inch apart; areolæ 6-7 between midrib and edge, each containing an oblong-reniform sorus about a line long. Nearest *M. reticulatum*, but more membranous in texture and opaque, with much less distinct veins and fewer larger areolæ and sori.

MENISCIUM GIGANTEUM, *Mett.*—Known before only in Peru, where it was discovered by Lechler. (No. 2292.)

10*. ACROSTICHUM (*Elaphoglossum*) CASTANEUM, *Baker*, n.sp.—Rhizome woody, short-creeping, as thick as a goose's quill; scales small, brown, linear, crisped. Stipes of barren frond 6-10 inches long, glossy, naked, castaneous. Barren frond lanceolate, bright green, chartaceous, naked, 12-15 inches long, 2-2½ inches broad, with no scales on either surface, but a few very minute linear deciduous ones at the edge. Veins distinct, forming an angle of about 60° with the midrib, about a line apart, simple or forked, ending each in a large dot, a distinct space within the margin. Fertile frond as broad as the barren one, but much shorter and with a much longer (18 inches) stipe. Lamina the size and shape of that of *latifolium*; veining like that of *Aubertii*.

33*. ACROSTICHUM (*Elaphoglossum*) FURFURACEUM, *Baker*, n.sp.—Rhizome woody, wide-creeping, $\frac{1}{4}$ inch thick; scales dense, linear, bright dark chestnut-brown, $\frac{1}{6}$-$\frac{1}{4}$ inch long. Stipes of barren frond 3-5 inches long, stramineous, clothed thinly throughout with minute linear brown scales. Barren frond oblong-lanceolate, 5-6 inches long, 1-1½ inch broad, deltoid at the base and tip, rigidly subcoriaceous,

green on both sides, thinly scattered over, especially on the upper surface, with minute lanceolate pale adpressed scales, which border the margin with a dense fringe. Veins close, rather obscure, nearly patent, ending in a dot which touches the margin. Fertile fronds as long, but narrower, on much longer stipes, the upper surface matted over with minute adpressed whitish ciliated scales. Near *A. discolor* and *Gardnerianum*.

43*. ACROSTICHUM (*Elaphoglossum*) PAPILLOSUM, *Baker*, n.sp.—Caudex short, woody, suberect; basal scales forming a dense mass, very minute, linear, dark brown. Stipe of barren frond 1-12 inches long, brown, with only a few minute linear deciduous dark brown scales near the base. Barren frond lanceolate, $\frac{3}{4}$-2 feet long, 2-4 inches broad, acute, narrowed very gradually to the base, moderately firm in texture, bright green on both sides, thinly scattered over on both sides with small linear adpressed brown-black entire scales, which are most abundant on the stout costa of the under surface and occur also sparingly on the margin. Veins distinct, nearly spreading or rather ascending, simple or forked, about $\frac{1}{16}$ inch apart, ending each in a large papillose dot distinctly within the border. Fertile frond narrower, on a longer stipe. General habit of *A. latifolium* and *scolopendrifolium*.

ACROSTICHUM BORYANUM, *Fée*.—New to the Andes.

45*. ACROSTICHUM (*Elaphoglossum*) SODIROI, *Baker*, n.sp.—Rhizome woody, wide-creeping, $\frac{1}{4}$ inch thick; scales dark brown, lanceolate, acuminate, $\frac{1}{6}$-$\frac{1}{5}$ inch long, membranous, slightly crisped. Stipe of barren frond about a foot long, furnished up to the top with a few ascending scales like those of the rhizome, which are deciduous in a late stage. Barren frond lanceolate, 6-8 inches long, 15-18 lines broad, narrowed gradually to the base and point, rigidly subcoriaceous, thinly covered all over, especially on the under surface, with adpressed linear bright brown entire scales reaching 1-1½ line in length, which also extend to the margin. Veins close, moderately distinct, simple or forked, forming an angle of about 70° with the costa. Fertile frond as long as the barren one, but narrower, with a longer stipe and abundant large linear scales mixed up with the capsules.

105*. ACROSTICHUM (*Gymnopteris*) INSIGNE, *Baker*, n.sp.—Rhizome woody, wide-creeping, as thick as a man's finger, densely clothed with crisped linear membranous bright brown scales $\frac{3}{8}$-$\frac{1}{2}$ inch long. Stipes distant, 1½-2 feet long, densely clothed with similar scales in the lower part, naked upwards. Barren frond oblong-deltoid, simply pinnate, 2½-3 feet long. Pinnæ oblong-lanceolate, the lower distinctly stalked, the upper sessile, the largest 9-10 inches long, 3-3½ inches broad, acute, obscurely lobed near the base only. Texture subcoriaceous; upper surface glabrous; lower finely pubescent all over. Main veins erecto-patent, distinct to the edge, at a distance from one another of $\frac{3}{8}$-$\frac{1}{2}$ inch; veinlets 5-6-jugate, forming an acute angle with the main veins, 3 or 4 pairs joining with those of the next group, those of the same group free. Fertile frond much smaller, bipinnate; upper pinnules entire, ligulate, obtuse; lower obtusely lobed. A very fine and very distinct plant.

LYCOPODIUM SAURURUS, *Lam.*—A fine variety, as deeply tinted throughout with bright red as *L. erythrocum*.

Lycopodium Transilla, *Sodiro*, n.sp.—Stem simple, decumbent at the base, bright red, reaching a length of two feet and a thickness of half an inch. Leaves uniform, ovate-oblong, ascending, densely imbricated, $\frac{1}{2}$ inch long, $\frac{1}{3}$-$\frac{3}{8}$ inch broad, narrowed suddenly to a broad base, obtusely deltoid at the tip, rigid in texture, glossy, bright red, the horny border minutely eroso-crenulate, the thickened midrib distinctly visible. Uppermost leaves quite similar to those of the centre of the stem. Capsules sessile in the axes of unaltered leaves down the stem, oblong-reniform, $\frac{1}{16}$ inch broad. A very fine giant new species of the *Selago* group, with a habit like that of the branch of a broad-leaved *Araucaria*.

REVIEW OF THE BRITISH SPECIES AND SUBSPECIES OF *POLYGALA*.

By Alfred W. Bennett, M.A., B.Sc., F.L.S.

(Tabs. 189, 190.)

The British species and subspecies of *Polygala* have been made an object of study by Prof. Babington, Dr. Boswell (late Syme), Mr. J. F. Duthie, and others; but, with the exception of the revision of the genus in the third edition of "English Botany" (1864), and that in the second edition of Hooker's "Student's Flora" (now passing through the press), there has been no recent attempt to collate the conclusions arrived at by the best observers. My own materials for examination have been a considerable series in my own herbarium gathered by myself and other collectors, a set of type-specimens of most of the British forms kindly sent me by Dr. Boswell, and a comparison of specimens in the herbaria of the British Museum, the Royal Gardens at Kew, the University of Cambridge, and that of Mr. J. Ball, F.R.S. In figuring the various forms I have always had the most characteristic parts, the wing-sepals, pistil, and ripe seed (where these were obtainable), multiplied about twelve and a half times under the camera, and then reduced by the lithographer.

Dr. Boswell (English Botany, 3rd ed., vol. ii.) and Dr. Hooker (Student's Flora, 2nd ed.) both make three British species of *Polygala*, viz., 1. *P. vulgaris*, Linn.; 2. *P. calcarea*, F. Schultz; and 3. *P. amara*, Linn., of Hooker, styled *P. uliginosa*, Fries, in the 1st ed. of the "Student's Flora," and *P. austriaca*, Crantz, in "English Botany." After much deliberation I have decided on retaining this distribution of the British forms, though with considerable hesitation, as two of the varieties of *vulgaris*, *oxyptera* and *grandiflora*, seem to me to have almost, if not quite, as much claim to specific rank as *calcarea*. Since, however, the boundary-line between variety and species is now admitted on almost all hands to be a purely arbitrary one, it seems most convenient not to disturb existing arrangements without more overwhelming reasons.

The following are the characters which seem to me most useful in distinguishing the various British forms.

1. Polygala vulgaris, *Linn.*

Stems wiry, ascending or decumbent. Leaves from ovate to lanceolate; those on the upper portions of the branches often linear-lanceolate, becoming gradually shorter and broader downwards; the lowest ovate, but always shorter than the upper leaves, and only moderately coriaceous. Racemes always terminal (never truly axillary), pyramidal and moderately dense-flowered; bract and bracteoles shorter than the fruiting pedicels. Flowers varying greatly in size and colour. Wing-sepals oval or obovate, usually broader than the capsule; veins more or less anastomosing, but not usually very conspicuous. Style longer than ovary, acute, with the stigmatic lobe about the centre or nearer the apex than the base. Capsule obcordate, usually narrower and shorter than the persistent green wing-sepals. Seed moderately hairy; aril with three short, blunt, nearly equal lobes or appendages, the dorsal one the shortest, the two lateral ones from $\frac{1}{4}$ to $\frac{1}{3}$ the length of the seed.

This species occurs throughout Europe, as far north as Scandinavia, being absent only from Sicily (according to Caruel), where it seems to be replaced by *P. Preslii;* in Morocco and other western districts of North Africa; and in western temperate and sub-arctic Asia. Its habitat is grassy situations and on heaths and hillsides up to a considerable altitude (nearly 3000 feet in the Highlands, more on the Continent). The flowers are most usually blue, especially on the Continent; though in this country white, pink, lilac, and purple are also common.

The following are the varieties or sub-species which offer the most marked characteristics, although, as before mentioned, it is impossible to draw any sharp line between them. The seven varieties named in De Candolle's "Prodromus" are of very unequal value; the majority appear to be mere individual forms, while γ. *elata* is *P. comosa*, Schkuhr, and η. *grandiflora* probably *P. rosea*, Desf.

Var. 1. *genuina*, Engl. Bot., 3rd ed., vol. ii., p. 35; subsp. *vulgaris* proper, var. 1, Hook. Stud. Flor.,* 2nd ed., p. 48; *P. vulgaris* auctorum. Branches erect or ascending, straight; upper leaves lanceolate; racemes 10-20-flowered; central bract about as long as the flowering pedicel; veins of wing-sepals anastomosing copiously; bracts, wing-sepals, and capsule not ciliated.

Figs. Reich. Pl. Crit., vol. i., t. 25; Ic. Flor. Germ. et Helv., t. mcccxlvi., f. 1; Benth. Hand. Brit. Flor., vol. i., p. 99, t. 124; Engl. Bot., 3rd ed., t. clxxxv. (flowers somewhat too large). [Tab. 189, fig. 1.]

It is difficult to distinguish the distribution of this variety from that of the entire species; but it is probably the most widely distributed form.

Var. 2. *depressa*, Engl. Bot., 3rd ed., vol. ii., p. 38; Bab. Man., 7th ed., p. 44; Hook. Stud. Flor., p. 49. *P. depressa*, Wenderoth

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* The references to Hooker's "Student's Flora" are always, unless otherwise stated, to the 2nd edition, not yet published, but of which the author has been kind enough to let me see the proof-sheets.

Schrift. d. Ges. Nat. Marburg, p. 1. *P. serpyllacea*, Weihe, Bot. Zeit., vol. ii., p. 705. Stems elongated, slender, flexuose ; the leaves small, and the lower ones often nearly or quite opposite ; racemes fewer-flowered and flowers rather smaller than in var. 1 ; central bract shorter than the flowering pedicel ; wing-sepals broad ; veins but slightly anastomosing ; appendages of aril short, blunt.

FIGS. Weihe l.c., t. 1 ; Reich. Ic. Flor. Germ. et. Helv., t. mcccxlvii., f. 1 (very characteristic) ; Engl. Bot., t. clxxxvii. (much too regular and formal). [Tab. 189, fig. 2.]

Differs from var. 1 chiefly in its more wiry and slender habit ; the flowers are also somewhat smaller and fewer, and the veins of the wing sepals rather straighter, with not so many fine anastomosing branches ; but it is difficult to draw up any other distinctive characters, and it seems to me very questionable whether it is entitled to the dignity of a subspecies. *P. depressa* is widely distributed throughout the British Isles and the Continent, and is especially abundant in heathy localities, in contrast to the more calcareous habit of the typical form. Our illustration is from a French specimen authenticated by M. Cosson.

Var. 3. *ciliata*, Engl. Bot., 3rd ed., vol. ii., p. 36 ; Bab. Man., 7th ed., p. 44 ; Hook. Stud. Flor., 2nd ed., p. 48. *P. ciliata*, Lebel in Gren. et Godr. Flor. France, vol. i., p. 195 ; Reich. Ic. Flor. Germ. et. Helv., vol. xviii., p. 90. Stems wiry and flexuose ; wing-sepals, and often the bracts, pedicel and capsule ciliated.

FIGS. Reich. Ic. Flor. Germ. et Helv. xviii., t. mcccxlvi., f. 5. [Tab. 189, fig. 3.]

Although this form has been erected into a species by some Continental botanists, I am very doubtful whether it ought to be retained even as a good variety. The ciliation of the wing-sepals, as well as of the capsule, seems a mere accidental local character ; in habit and in every other character it is, as far as I can see, indistinguishable from *depressa* ; and even the ciliation is not constant. Dr. Boswell says, in a letter to Prof. Babington, "Two-thirds of the plants picked at random are *not* ciliated, but quite indistinguishable in habit" ; while, on the other hand, a specimen of *depressa* from the Orkneys in my herbarium, authenticated by Dr. Boswell, has the wing-sepals distinctly ciliated, and I have also the ciliated form of *depressa* from Suffolk gathered by Mr. Duthie. Reichenbach's figure makes the style considerably longer than in the typical form ; but I have not been able to confirm this character in the English or Continental specimens at my disposal. Both Boswell and Hooker make this a variety of the sub-species *oxyptera* rather than of *depressa*, a location I am quite unable to understand, as it seems to partake of none of the special characters of the former ; the wing-sepals are always broad, as far as I have seen. The only recorded habitat in these islands for this variety is the Gogmagog Hills, Cambridgeshire ; but it is probably not very uncommon. On the Continent it is reported from several widely dispersed localities. Our illustration is from a specimen from the English locality, gathered by Dr. Boswell.

Var. 4. *oxyptera*, Engl. Bot., 3rd ed., vol. ii., p. 36 ; Bab. Man., 7th ed., p. 44 ; Hook. Stud. Flor., 2nd. ed., p. 48 ; Reich. Ic.

Flor. Germ. et Helv., vol. xviii., p. 90. *P. oxyptera*, Koch Syn., ed. i., p. 91. Stem weak, branching; stem-leaves linear; flowers distant, small, drooping when withered; wing-sepals from narrowly ovate to linear-oblong, membranous, longer and narrower than the ripe capsule, venation various; style considerably longer than in var. 1; capsule rounded below, emarginate; appendages of aril short, blunt.

FIGS. E.B.S., 2827; Engl. Bot., t. clxxxvi. (good); Reich. Ic. Flor. Germ. et. Helv., t. mcccxlvi., fig. 2 (not characteristic). [Tab. 189, fig. 47.]

In its extreme form this variety differs so widely from the typical plant in habit as almost to justify its being erected into a species, in which light I was long disposed to regard it. Independently of the more diffuse and prostrate habit, the narrower leaves, and the narrower wing-sepals, the smaller, more distant, and more deflexed flowers, and the more elongated style, are very characteristic. There are, however, all intermediate stages between this and the typical *vulgaris*, some differing from it in nothing but the narrower wing-sepals; our illustration does not represent this in by any means an extreme form. The venation of the wing-sepals is extremely variable; sometimes with one prominent mid-rib and a number of fine, anastomosing lateral veins; sometimes with three prominent nearly unbranched principal veins; indicating probably that they are accidentally associated by the common character of the narrower wing-sepals rather than genetically connected. It is not common, and appears to affect damp or sandy situations. The most characteristic specimens are from the Channel Islands, gathered by Prof. Babington, and from Deal, in Kent, from the herbarium of the late Mr. J. S. Mill. It is also recorded from Waterloo Sandhills, near Liverpool; Seacombe, Cheshire; Newhaven, Sussex; East Kent; Monmouthshire; from Stirling, in Scotland; from Cave Hill, Co. Antrim, and Meleaghs, Co. Down, in Ireland; and from several stations on the Continent. Our illustration is from a specimen gathered in Jersey by Prof. Babington.

Var. 5. *grandiflora*, Bab.* Man., 7th ed., p. 44; Engl. Bot., 3rd ed., vol. ii., p. 35; Hook. Stud. Flor., 2nd ed., p. 48; (non DC.), var. *buxifolia*, Ball MS. in Herb. (non Reich.). Upper leaves large, lanceolate, with thickened and somewhat revolute margins; wing-sepals broadly elliptical, apiculate; flowers large, dark blue.

This is a very remarkable form, and might well, according to the standard of many writers, be erected into a species. The large, almost shrubby growth reminds one of *P. Chamæbuxus*; the leaves are decidedly coriaceous, and the root-leaves considerably smaller than those which grow at some height on the stem, offering in this respect an exact contrast to *P. amara*. The large broad wing-sepals are more distinctly apiculate than in any other form. Unfortunately all the specimens I have been able to examine have been past flower, so that

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* In the 1st edition of Hooker's "Student's Flora" this variety is credited to "Syme," and in the 2nd to "Bosw.," evidently in error, as Dr. Boswell in "English Botany" quotes his description *verbatim* from Babington's Manual, and says that he has never seen the plant.

I am unable to describe the nature of the style. A good distribution of specimens by any of our Irish botanists through the Exchange Club would be extremely valuable. The only known locality is Ben Bulben, Co. Sligo, where it is apparently abundant; but I have never seen specimens except in the herbarium of Cambridge University, gathered by Prof. Babington, and in that of Mr. J. Ball. Nor has it yet been detected on the Continent; some specimens from the Eastern Pyrenees, collected by Petit, in the herbarium of the British Museum, presenting the nearest approach to it. The only original description hitherto is in Babington's Manual, from the 2nd edition onwards, all the others being borrowed from this. In Mr. Ball's herbarium it is labelled *P. buxifolia*, but it has nothing in common with Reichenbach's *P. buxifolia*, which appears to be a form of *P. calcarea*, nor with De Candolle's *P. vulgaris*, var. *η. grandiflora*, which may be Desfontaine's *P. rosea*. Our illustration is from a specimen gathered by Mr. Ball. [Tab. 189, fig. 5, and tab. 190.)

2. Polygala calcarea, *F. Schultz.*

P. calcarea, F. Schultz, Flora, 1837, vol. ii., p. 732; Engl. Bot., 3rd ed., vol. ii., p. 38; Bab. Man., 7th ed., p. 44; Hook. Stud. Flor., 2nd ed., p. 49; Reich. Ic. Flor. Germ. et Helv., vol. xviii., p. 89. *P. amara*, Don, E.B.S., et multorum auctorum (non Linn.). *P amarella*, Coss. Germ. Paris, 56 (non Crantz). *P. amblyptera* and *buxifolia*, *α. glabra*, Reich. Pl. Crit., vol. i., p. 26. *P. vulgaris*, var. *β.*, Hook. et Arn. Brit. Flor., ed. viii., p. 52.

Branches numerous, ending in leafy stems, on some of which the leaves form a rosette, from which the flower-shoots arise. Leaves crowded, from elliptical to obovate, usually somewhat coriaceous, the stem-leaves smaller and narrower than the root-leaves. Flowers large, bright blue, somewhat crowded; central bract longer than the flowering pedicel. Wing-sepals broadly elliptical or obovate, with the central vein strongly developed. Style short below the stigma, elongated above it into a funnel-shaped tip. Capsule narrowed below. Seed hairy; appendages of aril unequal, the two lateral ones acute and nearly or quite half the length of the seed.

Figs. Coss. Germ. Paris, t. vii. A; Reich. Pl. Crit., t. 50; Ic. Flor. Germ. et Helv., t. mccclxix., fig. 1 (not sufficiently compact in habit); E.B S., t. 2764; Engl. Bot., t. clxxxviii. (good, except some of the details). [Tab. 189, fig. 6.]

This species is at once distinguished from *P. vulgaris* by its habit, the large somewhat fleshy lower leaves, which decrease *gradually* upwards on the stem, and the umbellate arrangement of the flowering-shoots, which late in the season have the appearance of being axillary. The flowers are somewhat larger, and generally a bright blue, making this the handsomest of all the English forms. With the exception of the prominent midrib, the veining of the wing-sepals is much less conspicuous and scarcely anastomosing; the stigmatic lobe is often nearer the base than the apex of the style; and the two lateral lobes of the aril are decidedly longer and more acute than in *P. vulgaris* (our drawing of the seed is from an immature specimen, and does not show this character to advantage). This seems sufficient character to

retain the specific rank of *P. calcarea*, which is remarkably invariable, affording no well-marked varieties. It is distinctly calcareous in its habit, and much the most abundant on the chalk; it is recorded from Surrey, Sussex, Kent, Berkshire, Oxfordshire, Gloucestershire, Wiltshire, and Dorsetshire. On the Continent its distribution is similar, throughout Central and Southern Europe. Our illustration is from a specimen gathered by myself on Box Hill, Surrey.

3. Polygala amara, *Linn.*

Var. 1. *genuina*. *P. amara*, Linn. sp., 987; Reich. Ic. Flor. Germ. et Helv., p. 89; Hook. Stud. Flor., 2nd ed., p. 49 (non Don.). *P. austriaca*, Crantz, Austr., fasc. 5; Engl. Bot., 3rd ed., vol ii., p. 40; Reich. Ic. Flor. Germ. et Helv., p. 89; Bab. Man., 7th ed., p. 44. *P. amareila*, Crantz, Austr. v., 438. *P. uliginosa*, Fries, Sum. Veg. Scand., p. 32; Gren. et Godr. Flor. Fr., vol. i., p. 198; Hook. Stud. Flor., 1st ed., p. 47.

Stem simple, not above 2 inches high. Root-leaves large, fleshy, oval or ovate; stem-leaves much smaller and narrower. Flowers small, distant, blue. Wing-sepals linear-oblong, much narrower and rather shorter than the ripe capsule; the veins nearly simple and not anastomosing. Style short, thick, blunt. Capsule orbicular. Seed very hairy; appendages of aril broad, fleshy, about $\frac{1}{4}$ the length of the seed.

Figs. Reich. Pl. Crit., t. 39-41, 43, 44; Ic. Flor. Germ. et Helv., t. mcccxlviii., fig. 1-3; Crantz, Austr., fasc. v., t. 2., fig. 4. [Tab. 189, fig. 7.]

Great confusion has been imported into the genus by the indiscriminate use of the specific term *amara* for a great variety of forms, especially for *P. calcarea*, a totally different plant. I thoroughly agree with Dr. Hooker in identifying the English (Kentish) plant with the typical form of Linnæus's *P. amara*, as exemplified in the Linnean herbarium, and I cannot distinguish from this Crantz's *P. austriaca*, under which it has generally been ranged. Indeed, Reichenbach's figures of *P. austriaca*, *uliginosa*, and *amara* appear absolutely identical. Although the species is widely dispersed, and somewhat variable on the Continent, all the forms are at once distinguished from either of the two preceding species by the rosette of large fleshy leaves lying close on the ground, and the *sudden* transition from these to the much smaller stem-leaves; the flowering-stem is also always simple (I do not think it is truly axillary as described in the Student's Flora), and never more than 2 or 3 inches high; the flowers are always much smaller and more distant, and apparently always blue.* Among the more minute characters, the wing-sepals are even narrower and shorter than in *P. oxyptera*, and the three prominent veins scarcely at all branched; the ovary and capsule are rounder; the style much shorter and thicker; and the appendages of the aril thicker and more fleshy, though not longer, than in *P. vulgaris*. The root and whole plant are described as having an intensely bitter taste. This typical

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* Notwithstanding Reichenbach's apparently erroneous character "flores semper albi."

form of the species was first discovered in June, 1871, by Mr. J. F. Duthie on Wye Downs, Kent,* where it grows at several spots, but is still unknown in any other locality; it ought carefully to be looked for throughout Great Britain. As far as can be ascertained from the confusion of the nomenclature, the species is widely dispersed on the Continent, with rather a northern distribution. Our illustration is from an English specimen gathered by Mr. Duthie.

Var. 2. *uliginosa*, Fries (?), Engl. Bot., 3rd ed., vol. ii., p. 40; Bab. Man., 7th ed., p. 45; Hook. Stud. Flor., 2nd ed., p. 49. Raceme more compact and shorter; flowers pink; capsule wedge-shaped below.

Fig. Engl. Bot., t. clxxxix.

It is very difficult, from the scarcity of specimens, to determine whether this should be ranked as a distinct variety, or what its relation is to the Continental form bearing the same name. It does not agree well with Reichenbach's figure, which scarcely differs from the typical *P. amara*. The English plant appears to represent a more Arctic and swampy form, and is probably identical with Fries's *P. uliginosa*, which is certainly not specifically distinct from *P. amara*. The only known British locality is Cronkley Fell, and one or two other spots in Teesdale, where it was discovered by Mr. James Backhouse in 1852.

Description of Tabs. 189, 190.

Tab. 189.—Fig. 1. *Polygala vulgaris*, var. *genuina*; *a*. wing-sepal, *b*. pistil, *c*. ripe seed. Fig. 2. *P. vulgaris*, var. *depressa*; *a*. wing-sepal, *b*. pistil, *c*. ripe seed. Fig. 3. *P. vulgaris*, var. *ciliata*; wing-sepal. Fig. 4. *P. vulgaris*, var. *oxyptera*; *a*. wing-sepal, *b*. pistil, *c*. ripe seed. Fig. 5. *P. vulgaris*, var. *grandiflora*, wing-sepal. Fig. 6. *P. calcarea*; *a*. wing-sepal, *b*. pistil, *c*. immature seed. Fig. 7. *P. amara*, var. *genuina*; *a*. wing-sepal, *b*. pistil, *c*. ripe seed. (All magnified 12·5 times under the camera, and reduced by the artist.)

Tab. 190.—*Polygala vulgaris*, var. *grandiflora*.

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. Holmes, F.L.S.

(*Continued from* p. 113.)

Bryum pendulum, *Hornsch.* *Bryum cernuum*, Hedw. (Wils.; Hobk.)
On walls, rocks, and gravelly or sandy places. Frequent. May.
Bry. Eur. iv., t. 331.
Tunbridge Wells; *Jenner Tunbr. Supplt.* Ightham; Sandwich.
Very easily recognised by the ventricose capsule, the small conical lid, and the inner peristome adherent to the outer teeth.

B. intermedium, *Brid.*
On sandy banks, walls, and gravelly places. June to December.
Bry. Eur. iv., t. 356.
On a damp sandy ledge in a lane leading from Pembury Road to Bayham Abbey. October.
Easily known by having fruit in all stages late in the summer and autumn, and by the small, very persistent lid of the capsule.

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* Journ. Bot., 1871, p. 212.

1. var. genuina.

2. var. depressa.

3. var. ciliata

4. var. oxyptera.

5. var. grandiflora.

6. P. calcarea.

7. P. amara.

British Polygalæ.

Kate Bennett del. Blair lith. Mintern Bros. imp.

Blair del. et lith.

Polygala vulgaris var. grandiflora

Mintern Bros. imp.

B. BIMUM, *Schreb.*

In marshy or wet places. June, July. Bry. Eur. iv., t. 363.

On a damp wall near a ditch, Ightham; abundant in marshes near Sandown Castle, Deal.

Distinguished from *B. capillare*, which it approaches in size, by its narrower, more tapering leaves, which are less twisted when dry, and by its lid not being red when mature.

B. TORQUESCENS, *Br. & Sch.*

Rocks, old walls, and stony places. Rare. May, June. Bry. Eur. iv., t. 358.

Near Tunbridge Wells; Mr. Jenner, *Bry. Brit.*, p. 239; Ightham.

The capsule and leaves are very like those of *B. capillare*, but the capsule tapers towards the seta, and the inflorescence is synoicous.

B. PALLESCENS, *Schwægr.*

On sandstone rocks and walls in hilly districts. May, July. Bry. Eur. iv., t. 359.

On the churchyard wall, Chiddingstone, near Penshurst, in company with *Leptobryum pyriforme*; Southborough.

Remarkable for its dense tufts matted together firmly with purplish radicles. The leaves have longer points than in *B. bimum*, which has also purplish radicles.

B. ERYTHROCARPUM, *Schwægr.* *B. bicolor*, Dicks. (Forst. Tonbr.)

On damp sandy heaths and on sloping sandy banks in woods. May, June. Bry. Eur. iv., t. 376.

Ightham Common; in a sand-pit near Penshurst Station; Swanscombe Wood.

Grows in loose tufts; the leaves are spreading, and the whole plant has frequently a pinkish hue, and the capsule is blood-red when mature. *Bryum pallens* has also a pinkish hue, but the leaves are broader, more concave, and erect, and the capsule is pale.

B. MURALE, *Wils.*

On mortar of recently-made walls. Not common. April to June.

Woolwich, near Sibertswold; *Gray!* Egerton; *George!* Charing Heath, on a wall, abundant; Ightham and Borough Green.

When mature the capsule is purple like that of *B. atro-purpureum*, but when young it is very different in shape, being pear-shaped and tapering towards the seta, the capsule of *B. atro-purpureum* being largest towards the seta and tapering towards the mouth.

B. ATRO-PURPUREUM, *Web. et Mohr.*

On mud-capped walls and damp bare earth. Frequent. April to June. Bry. Eur. iv., t. 378.

Tunbridge and elsewhere; *Jenner Tunbr.* Ightham; *Howse!* Near Penshurst, on boulders in a stone yard; Keston Common; Swalecliff, near Whitstable.

The capsule is very like that of *B. argenteum*, but the leaves are not silvery as in that species.

B. CÆSPITICIUM, *L.*

On dry walls, roofs, &c. May, June. Bry. Eur. iv., t. 374, 375.

Rochester; *Howse!* Wall near Hayes Common; Chislehurst; Shorncliffe; Ightham.

Known from *B. cernuum* by its large mammillate lid and perfect inner peristome, and from *B. intermedium* and *B. inclinatum* by its dioicous inflorescence.

B. CAPILLARE, *Hedw.*

On walls, rocks, trees, banks, &c. Very common, May. Bry. Eur. iv., t. 368.

Dunton Green; Otford; Keston Common; Sibertswold; Ightham; Herne Bay; Penshurst Park; Otford; Tunbridge Wells.

The obovate leaves with long hair-points, strongly twisted when dry, and the large capsule with a reddish lid, easily distinguish this species.

B. DONIANUM, *Grev.* *Bryum platyloma*, Schwægr. (Bry. Eur.)

Sandy banks in hilly districts. April to June. Bry. Eur. iv., t. 26.

Sandy banks, Ightham; Newington, near Sandgate, in fruit abundantly; Bexley; Sandling, near Maidstone.

B. PALLENS, *Swartz.* *Bryum nitidum rubens capitulis reflexis foliis angustis pellucidis cauliculis proliferis*, Ray Syn. iii., p. 102, 55.

In wet places near ditches and springs. Rare. June. Bry. Eur. iv., t. 373.

Shooter's Hill; *Ray. Syn.*

Easily recognised by its pink foliage and pale ventricose capsules.

B. ROSEUM, *Schreb.* *Bryum roseum majus foliis oblongis*, Ray. Syn. iii., p. 92, 1.

On shady banks and in damp woods in hilly districts, usually on sandy clay. Rare. December. Not observed in fructification. Bry. Eur. iv., t. 365.

Shooter's Hill, near Eltham; *Ray. Syn.*, l.c. Willesboro' Lees, near Ashford.

B. ARGENTEUM, *L.*

On walls, roofs, in fields, and by waysides. Common everywhere. Oct, Nov. Bry. Eur. iv., t. 384.

Ightham; Folkestone; Sibertswold; Greenhithe.

EPIPTERYGIUM TOZERI, *Lindb.*

In crevices and holes in damp shady banks, on a sandy or clayey soil. Rare. March, April. Bry. Eur. iv., t. 16.

Swanscombe Wood, with barren flowers; Rev. C. A. Johns, *Bry. Brit.*, p. 249.

Mniaceæ.

MNIUM CUSPIDATUM, *Hedw.*

On shady rocks and walls in limestone districts. Rare. March, April. Bry Eur. iv., t. 396.

In the wilderness at St. Clare, near Ightham; *Jenner Tunbr.* Marshy meadows near the coast, Sandwich.

Known from *M. hornum* and *M. serratum* by its obovate leaves with an excurrent nerve, and by the spines on the margin being single.

M. AFFINE, *Bland.*

In shady woods, on banks, walls, and in marshes. April, May. The fructification rare. Bry Eur. iv., t. 397.

Sandling, near Maidstone; with fruit in a copse near a sandpit on Peneden Heath; *Jenner Tunbr.*

In a barren state this species may be known by the leaves being broadest below, and sharply serrated to the base with single spines.

M. UNDULATUM, *Hedw.*

Damp shady places. Very common. April, May. Bry Eur. iv., t. 389.

Hurst Wood, in fructification; *Jenner Tunbr.* Abbey Wood; Maidstone; Dover; Swanscombe Wood.

M. ROSTRATUM, *Schwægr.*

On stones and rocks in streams and on damp shady walls. April, May. Bry Eur. iv., t. 395.

In fructification on the banks of the river which parts Sussex and Kent, between Sandhurst and Bodiam; *Jenner Tunbr.* St. Mary Cray; *Howse!* Ightham Common, on damp sand rocks; Dover; Romney Marsh; Willesboro' Lees.

Much resembles *M. punctatum* in the shape of the leaf and capsule, but differs in having faintly toothed leaves and nerve excurrent in a short point.

M. HORNUM, *L. Bryum nitidum capitulis majoribus reflexis, calyptra imum vergente pediculis oblongis e cauliculis novis egredientibus,* Ray. Syn. iii., p. 102, 51.

In shady woods and on hedgebanks. Very common. April, May. Bry Eur. iv., t. 390.

Charlton Wood; *Ray Syn.*, l.c. Abbey Wood, abundant; Long Beech Wood, near Charing; Maidstone; Dover; Ashford; Tunbridge Wells; Otford; Ightham; Ashover Wood.

M. STELLARE, *Hedw. Bryum stellare* (Forst. Tonbr.)

On wet banks in shady lanes. Rare. May, June. Not observed in fructification. Bry Eur. iv., t. 399, 400.

At the dropping spring near Langton Green; *Forster Tonbr.* In a lane near Long Beech Wood, Charing; in a wood west of Dover.

Easily distinguished by its leaves having no thickened margin, and by the pale hue of the top of the tufts, which turns to a bluish colour when bruised.

M. PUNCTATUM, *Hedw.*

By the sides of springs and at the foot of wet rocks in shady places. Not common. April, May. Bry Eur. iv., t. 387.

By the Kentish side of the stream opposite the High Rocks; Ightham Common; Joyden's Wood; Ashover Wood; in a wood west of Dover.

This species is easily recognised by its entire, margined leaves.

[*M. subglobosum*, which is very similar in appearance, but has synoicous flowers, and nerve ceasing considerably below the apex of the leaf; should be looked for in Kent, in boggy places and marshes.]

[*M. orthorhynchum*, Brid., which has been found in Sussex should also be looked for. The leaves have a double row of spines as in *M. hornum*, but they are broadest below the middle of the leaf and have an excurrent nerve.]

AULACOMNION ANDROGYNUM, *Schwæg.* *Mnium perangustis et brevibus foliis.* Ray. Syn. iii., p. 78, 1. *Bryum androgynum*, Jenner Tunbr.

In dry woods and on sandy shady hedgebanks. Frequent. The fructification exceedingly rare. May. Bry. Eur. iv., t. 406.

In thickets on dry hilly places, near Woolwich; *Ray. Syn.*, l.c. Abbey Wood, near Erith, in fruit; Mr. Mitten, 1843, *Bry. Brit.*, p. 217. Tunbridge Wells Common; *Jenner Tunbr.* Darenth Wood, near Dartford; Chislehurst; Rusthall Common. on the sand rocks; Ightham.

Bartramiaceæ.

Tribe I. *Gymnocybeæ.*

GYMNOCYBE PALUSTRIS, *Fries.* *Aulacomnion palustre*, Schwægr. (Wils.; Hobk.)

In bogs. Not common. June. Bry. Eur. iv., t. 405.

Keston Common, in fruit; *Howse!*

Tribe II. *Bartramieæ.*

PHILONOTIS FONTANA, *Brid.* *Bartramia fontana*, Brid. (Wils.; Berk.)

Wet places and bogs. Not common. June. Bry. Eur. iv., t. 324.

Damp roadside near Biddenden.

BARTRAMIA POMIFORMIS, *Hedw.* *Bryum pomiforme*, L. (Huds. Fl. Ang., p. 998, 23.)

Hedgebanks in hilly districts. April, June. Bry. Eur. iv., t. 317.

About Woolwich; *Huds. Fl. Ang.* Rusthall Common; *Forster Tonbr.* Near Keston Common; Borough Green; Ightham Common; Willesboro' Lees, near Ashford; Brenchley; Toys Hill; about Chilstone Park, near Lenham; Halstead; Hythe.

B. ITHYPHYLLA, *Brid.*

On hedgebanks in subalpine districts. Very rare. May, June. Bry. Eur. iv., t. 317.

In a damp lane near Long Beech Wood, Charing; Halstead.

Known from the last by the white bases of its erect rigid leaves, which are not crisped when dry.

(*To be continued.*)

SHORT NOTES.

PLANTS OF IRELAND.—A small collection, composed of flowering plants, ferns, seaweeds, and zoophytes, gathered chiefly in the counties of Cork, Kerry, Galway, and Dublin, by a Mr. Jno. Reilly (lately deceased), was placed in my hands to look over, and the following Irish rarities were detected amongst the Phanerogams.—*Ranunculus auricomus*, Linn. "Lord Sligo's demesne, Westport." Rare in Western Ireland, and new to district 8 of "Cyb. Hib."—*Matthiola sinuata*, Brown. "Straw Island, Galway Bay, June, 1836." Not seen there lately,

"Cyb. Hib."—*Ononis spinosa*, Linn. "Near Cork, July, 1844." There is a query attached to the specific name of this specimen, and being in bad condition it must remain doubtful.—*Lathyrus maritimus*, Bigel. "Sandhills, Killorglin Bay, July, 1845." The only Irish locality, and I believe not gathered there recently.—*Medicago sativa*, Linn., *M. falcata*, Linn. "Portmarnock, 1839." Probably introductions.—*Artemisia maritima*, Linn. "Co. Clare, Sept., 1839." Very rare in Ireland; the only localities hitherto known are confined to a portion of the east coast (see "Cyb. Hib." and its supplement).—*Inula Pulicaria*, Linn. This specimen, labelled "*Pulicaria vulgaris*, Cromane, Kerry," is, if the locality be correct, an addition to our Irish flora. On close examination it may be observed that the locality was added some time after the name was written. There is little doubt, however, that Mr. Reilly must have been at Cromane, for there are several specimens so labelled in his herbarium. Having visited the place myself some years ago, I believe it to be quite possible the locality given is correct, but before *Inula Pulicaria* can be received into our Irish list confirmation is desirable.—*Campanula rotundifolia*, Linn. "Black rock, Salt Hill Road, Galway." One of the specimens thus labelled is very near the splendid variety which Mr. A. G. More has termed *speciosa*, gathered by him on an island off the coast of Mayo. (See Report on the Flora of Innish, Bofin, in "Proceedings Royal Irish Academy," vol. ii., new series (Science), p. 571; Journ. Bot., 1876, p. 373.)—*Pinguicula grandiflora*, Lam. "A field near Blennerville, Tralee." This extends the northern range about twenty miles."—*Solanum Dulcamara*, Linn. "Near Fenet Coastguard Station, seashore, Tralee, Kerry;" also "near Menlo Castle, Galway." Rare and local in Ireland.—*Galium boreale*, Linn. "Mangerton Mountain, Killarney." Confirming locality given in "Flora Hibernica."—The Zoophytes have been purchased by the Royal Dublin Society, I have taken the Phanerogams, and the seaweeds await a purchaser. John Reilly died last summer, aged about eighty-three. When a young man he was a tutor at Ballitore school, where the famous Edmund Burke was educated. Subsequently he entered the Government service as a revenue officer, and as such lived in different parts of Ireland, chiefly at seaports. He was little known even to Irish botanists. His collection though small is creditable to a man in his position, but it is to be regretted that many specimens are without localities.—Richard M. Barrington.

Carex ericetorum in Suffolk (v. p. 85).—I enclose specimens of *Carex ericetorum*, Poll., which I gathered on Saturday, May 12th, on Icklingham Heath, between Thetford and Barton Mills, in West Suffolk. It was growing with *C. præcox* (but much more abundant) between the tufts of heath (*Calluna vulgaris*) and among short grass, *Sedum acre*, *Cerastia*, &c. I also found it on the grassy borders of the road beyond Icklingham Heath, towards Barton Mills, and I found one specimen on Risley Heath. The same day I gathered *Veronica verna* and *triphyllos*, and *Muscari racemosum*.—The noticeable feature of the botany of this part at this time of the year is the profusion of *Draba verna* and *Saxifraga tridactylites*, which grow on the banks and on the sandy heaths in such abundance as to give a *mass* of

colouring of white and faint red. I looked carefully for anything in the *Cerastium* way like *pumilum*, but was obliged to refer all to *semidecandrum*. I found *Arenaria* (*Alsine*) *tenuifolia*, but could not detect the form *hybrida*, but I did not go to its station on "Redruch Heath."—A. BENNETT.

PLANTS OF GLAMORGANSHIRE.—I collected a few days ago examples of *Draba aizoides*, *Hutchinsia petræa*, and *Cochlearia danica* on rocks near the Worm's Head, Gower, Glamorganshire, and thinking you may like these specimens, enclose them. Glamorgan is left blank in "Topographical Botany" for *Cochlearia danica*, although I saw it in some plenty in several places along the coast. I believe the *Hutchinsia* is not often collected in S. Wales.—THOS. BRUGES FLOWER.

ALCHEMILLA CONJUNCTA, *Bab.*—As it has been doubted if Mr. A. O. Black found this plant in Scotland, it may be as well to put his exact directions to the place on record. I copy from my herbarium a note in his hand. "The exact station is about 300 feet from the base of the Glen Dole side of Craig Rennet, Clova, on the left-hand side of the first *large* ravine which comes down from Craig Rennet on entering Glen Dole. I only saw one patch of it, but that a very large one, about 8 or 10 feet square. Aug. 1853.—*A. O Black.*" The specimens are fine, and have, as I think, a few minute bits of mica sticking to them, although they have been very carefully washed. Dr. N. Tyacke (M.D., now of Chichester) gave me specimens from "Glen Sannox, Arran, 1832." They are, I fully believe, the true plant. No other botanist has found it there, or at Clova; but it well deserves a careful search in both places.—C. C. BABINGTON.

Extracts and Abstracts.

OFFICIAL REPORT FOR 1876 OF THE DEPARTMENT OF BOTANY IN THE BRITISH MUSEUM.

BY W. CARRUTHERS, F.R.S.

THE work of incorporating plants in the General Herbarium has been actively carried on during the past year. The large additions made in 1873 to the cabinets for the Herbarium afforded accommodation for the collections that have since been incorporated; but the crowded state of the Herbarium has required another large addition of 93 cabinets during the year, and the erection of a temporary gallery in one of the rooms for the accommodation of the collection of Cellular Cryptogams. The whole Herbarium has consequently been redistributed, and room has been secured for further additions.

During the progress of the work of incorporation, the following Natural Orders have been greatly increased, and more or less completely re-arranged: — *Leguminosæ*, *Rosaceæ*, *Rubiaceæ*, *Compositæ*, *Convolvulaceæ*, *Scrophularineæ*, *Labiatæ*, *Euphorbiaceæ*, *Chenopodiaceæ*, *Orchideæ*, and *Gramineæ*.

The following collections have been either entirely or in part

systematically arranged, and inserted in their places in the General Herbarium :—Plants from Tropical Africa, collected and named by Dr. Schweinfurth; from the Island of Rodriguez, collected by Dr. I. B. Balfour; from China, by the Rev. James Lamont and F. B. Forbes, Esq.; from Australia, by Menzies, Collie, and Paterson; from New Zealand, by Dr. Hector; from Oregon, by Geyer; from Mexico, by Schiede and Fendler; from Chili, by Reed; and from Tropical South America, by Claussen and Linden.

Two very valuable collections of plants have been acquired by the Trustees during the year, viz. :—The study set of Robert Brown's great Herbarium of Australian plants, and the second set of the plants collected in Tropical Africa by the late Dr. Welwitsch.

Mr. Brown's Herbarium was the property of the late J. J. Bennett, formerly keeper of the Botanical Department of the Museum. The first, or study set, together with all the notes and manuscripts of Mr. Brown, has been presented to the Museum by Mr. Bennett's widow, in accordance with his instructions. Considerable progress has been made in the separation of the study set.

Dr. Welwitsch, by his will, required his executors to offer the study set of his African plants to the Trustees, at the price of two pounds ten shillings per hundred. The executors were stopped carrying out the provisions of the will through the action of the King of Portugal, and a bill was filed in Chancery claiming the whole collection as the property of the Crown of Portugal. After a lengthened and expensive litigation, the case was terminated by a compromise, which secured to the Trustees the next best set after the study set, with copies of the original notes and descriptions, at the cost only of separation and transcription. The work of separating and transcribing is being diligently prosecuted, and this important series of plants is becoming available to men of science.

The Moss Herbarium of James Dickson, which contains the types of the species described by him in his "Fasc. Pl. Crypt. Britann.," has been acquired from his daughter.

Two important collections of drawings of Fungi have become the property of the Trustees during the year. The one is of great critical value, consisting of the original drawings by Sowerby of his classical work on English Fungi. It has been presented by the Rev. M. J. Berkeley, and comprises 530 original drawings, and copies of 347 plates. The Trustees had already acquired by purchase the models of the Fungi made by Sowerby in the progress of his work, as well as the original drawings of his "English Botany." By this gift the series of Sowerby's illustrations of the indigenous Flora of Britain, in the British Museum, is completed. The other collection consists of 733 original coloured drawings of the higher Fungi, made by the late Mrs. Anna Russell of Kenilworth, and bequeathed by her to the Museum. These drawings are of especial value, as they represent with singular fidelity the form and colour of a group of plants which at the best are very imperfectly represented in Herbaria. The two collections, with the large series of drawings by Mr. W. G. Smith, acquired in 1875, have been incorporated into one series.

The following are the principal additions to the collections of the Department during the year 1875 :—

A large series of desiderata from the Herbarium of J. G. Baker, Esq.

281 species of Phanerogamia and Ferns, and 80 species of Lichens; collected by Dr. I. B. Balfour, in the Island of Rodriguez, during the Transit Expedition; presented by the Council of the Royal Society.

80 species of Freshwater Algæ, and 44 species of Lichens; collected by the Rev. A. Eaton, in Kerguelen's Land, during the Transit Expedition; presented by the Council of the Royal Society.

294 species of plants from the Island of Formosa; collected and presented by the Rev. W. Campbell, of Taiwanfoo, Formosa.

200 species of plants from New Zealand; collected by Dr. Hector.

160 species and varieties of Palms from the Amazon region; collected and presented by Dr. Trail.

3 species of Palms from Bourbon; collected and presented by Dr. I. B. Balfour.

149 species of plants from False Bay, Cape of Good Hope; collected and presented by Dr. Hahn.

60 species of flowering plants from the neighbourhood of Godhavn, Greenland; collected and presented by Captain Fielden.

107 species of Orchideæ, named by Professor Reichenbach.

99 species of plants from Egypt; collected and presented by H. A. Hurst, Esq.

237 species of plants from Southern Europe; collected and named by Huter.

A collection of plants from the Assyr Mountains, in the Yemen, Arabia, through the Rev. A. B. Millington.

20 varieties of Nepenthes, cultivated and presented by H. J. Veitch, Esq.

59 species of Freshwater Algæ and 80 species of Lichens, from the Cape of Good Hope; collected and presented by the Rev. A. E. Eaton.

500 species of Fungi; collected and named by Thuemen.

400 species of Fungi; collected and named by Saccardo.

100 species of Fungi; collected and named by Rehm.

59 preparations of Cape Algæ, by Dr. Reinsch.

Specimens have also been contributed to the Herbarium by Lord Walsingham, Sir P. de Malpas Grey Egerton, Bart.; Sir W. C. Trevelyan, Bart.; Messrs. R. A. Pryor, J. C. Mansel-Pleydell, F. M. Webb, A. Craig Christie, M. Moggridge, E. M. Holmes, T. Howse, H. Groves, C. Packe, and Professor T. R. Jones.

Figures of 2991 species of plants have been added to the collection of Botanical Illustrations during the year.

The number of visits paid during 1876 to the Herbarium for scientific inquiry or research was 1237. The following foreign botanists may be specified as having used the Herbarium in prosecuting their various studies:—Professor Cohn, of Breslau, for his works on Cryptogamic Botany; Dr. Baillon, of Paris, for his works on Systematic Botany; Professor Reichenbach, of Hamburg, for his Memoirs on *Orchideæ*; Dr. Bauke, of Berlin, for his investigations in the minute Fungi; M. C. de Candolle, for his Monograph of the *Meliaceæ*; and Professor von Ettingshausen, of Gratz, for his investigations on Fossil Plants. Among British Botanists, the following may be specified:—Professor Bentley, in connection with Bentley and Trimen's "Medici-

nal Plants;" Mr. Holms, Curator of the Museum of the Pharmaceutical Society, for his investigations in connection with Medicinal Plants; General Munro, for his Monograph of the *Gramineæ;* Mr. W. P. Hiern, for his work on the *Rubiaceæ* of the "Flora of Tropical Africa;" Mr. Bentham, for his "Flora Australiensis;" Dr. Trail, for his work on the Palms of the Amazon Region; Dr. I. B. Balfour, for his work on the Flora of the Island of Rodriguez; Mr. J. G. Baker, for his Monograph of the *Liliaceæ;* Dr. Masters, for his work on the *Restiaceæ;* Mr. Duthie, for the *Myrtaceæ* of the "Flora of British India;" the Rev. J. M. Crombie, Mr. Labalestier, and Mr. Joshua, for their investigations into the Lichens of Britain; Mr. Broome and Mr. Howse, for British Fungi; Rev. W. W. Newbould, Mr. B. D. Jackson, Mr. Pryor, Mr. Mansel-Pleydell, Mr. Webb, Mr. Glasspoole, Mr. Townsend, Mr. Churchill, and Mr. Stratton, for their critical study of European and British Plants; Dr. Braithwaite and Mr. Holmes, for the study of British Mosses; and Mr. J. S. Gardner, for the study of the Tertiary Plants of Hampshire.

GEOGRAPHICAL STATISTICS OF THE EXTRA-BRITISH EUROPEAN FLORA.

By Thomas Comber.

(*Continued from* p. 151.)

Albumen.—The more extensive range of British plants with albuminous seeds, and especially of those in which the albumen is floury or mealy, is also repeated in the Continental flora; the averages being:—

Species.				Average.
1072	with albumen	floury or mealy	. . .	2·99
2307	,,	,, fleshy or horny	. . .	2·61
3204	,,	,, absent or very scanty	. .	2·49

As bearing on the question whether albuminous seeds the better survive carriage by ocean currents, I referred in my former paper to Mr. Darwin's well-known experiments on the resistance of seeds to the action of sea-water. By the courtesy of Prof. De Candolle I have since received an account of a series of experiments on the same point by M. G. Thuret, of Antibes, who kept the seeds of a number of plants in sea-water for so long a period as thirteen months. In some instances the material he used seems to have been bad, as the seeds did not germinate even when kept dry. Leaving such cases out of consideration, I find that of the albuminous-seeded species experimented on 43¾ per cent. germinated, most of them vigorously, and as well as if they had not been in sea-water at all; while of the exalbuminous-seeded species only 27¼ per cent. germinated, and all of these very sparingly, merely a few seeds growing out of a large number.

What relation the presence or absence of albumen in a seed may bear to its retention of vitality has scarcely been made a subject of

inquiry. That distinguished botanist, the late Robert Brown, expressed the following view in his "Botany of Congo." Commenting upon the lists therein published of species common to Equinoctial Africa and other continents, and referring to dispersion by natural causes, he observes:—"It may be stated as not unfavourable to it that of the dicotyledonous plants of the lists a considerable number have the embryo of the seed highly developed, and at the same time well protected by the texture of its integuments. This is the case in the Malvaceæ, Convolvulaceæ, and particularly in the Leguminosæ, which is also the most numerous family in the lists, and in several of whose species, as *Guilandina Bonduc* and *Abrus precatorius*, the two conditions of development and protection of the embryo co-exist in so remarkable a degree that I have no doubt the seeds of these plants would retain their vitality for a great length of time either in the currents of the ocean, or in the digestive organs of birds or other animals. . . . The dicotyledonous plants in the lists which belong to other families have the embryo of the seed apparently less advanced, but yet in a state of considerable development, indicated either by the entire want or scanty remains of albumen; the only exception being *Leea*, in which the embryo is many times exceeded by the size of the albumen. In the monocotyledonous plants, on the other hand, . . . the embryo bears a very small proportion to the mass of the seed, which is formed of albumen, generally farinaceous. But it may be observed that the existence of a copious albumen does not equally imply an inferior degree of vitality in the embryo, but may be considered as the natural structure of that primary division, seeds without albumen occurring only in certain genera of the paradoxical *Aroideæ*, and in some other monocotyledonous Orders, which are chiefly aquatic."

To test whether the absence of albumen from the seeds of Dicotyledons especially is favourable to dispersion, the following comparison is confined to that class alone:—

Species.		Average.
2501	with albuminous seeds	2·67
3140	,, albumen absent or very scanty . .	2·47

Our British Dicotyledons divide as follows:—

Species.		Average.
402	with albuminous seeds	6·77
372	,, albumen absent or very scanty . .	6·46

While from Prof. De Candolle's calculations (Geog. Bot., vol. i, pp. 515 to 517) the result obtained respecting the dispersion of dicotyledonous Orders is:—

Orders.	Species.		Per-centage found in more than two districts.
101 . .	22483	with albuminous seeds . .	4·6
59 . .	26877	,, exalbuminous ,, . .	3·7

In none of the three comparisons, therefore, is Mr. Brown's view supported.

VIII. Dispersion according to classification.—*Large Orders.*—The Orders which contain more than 100 Continental species are:—

	Species.	Avge.		Species.	Avge
Ranunculaceæ . .	180	3·52	Campanulaceæ .	133	1·82
Cruciferæ . . .	438	2·66	Scrophulariaceæ .	265	2·32
Caryophyllaceæ .	350	2·32	Labiatæ . . .	313	2·30
Leguminosæ . .	644	2·39	Boraginaceæ . .	150	2·32
Rosaceæ	126	3·36	Liliaceæ . . .	185	2·12
Umbelliferæ . .	368	2·44	Cyperaceæ . . .	114	4 65
Rubiaceæ . . .	109	2·09	Graminaceæ . .	358	3·10
Compositæ . . .	1117	2·20			

Taken together they average 2·50 against 2·99, the average of the remainder of the flora. Classing the Orders, according to the number of species they comprise all over the world, into "large" with over 1000 species, "moderate" with 500 to 1000, and "small" with fewer than 500, we get the following averages:—

Species.			Average.
4222	belonging to	16 "large" Orders . .	2·52
1112	,,	13 "moderate" Orders . .	2·65
1249	,,	"small" Orders . . .	2·87

Like the British averages previously ascertained, they are in inverse proportion to the size of the Orders.

(*To be continued.*)

A new Order of Algæ.

On the Development and Systematic Arrangement of the Pithophoraceæ, a new Order of Algæ. By Veit Brecher Wittrock. Upsala. 1877.

One of the principal characters of this Order, represented by the single genus *Pithophora*, is a branched thallus, the branches taking origin from the upper part of the mother-cell at a short distance below its top. On examining an individual, one sees that it consists of two regions, a unicellular usually unbranched basal portion (the "rhizoid" part), and a multicellular usually branched "cauloid" part. Ramification of this cauloid part is often various in degree in the same species. In *P. sumatrana* the branches are of the first degree only; in five other species (*P. Kewensis*, *æqualis*, *polymorpha*, *Cleveana*, *Zelleri*) either of the first or second degree (and sometimes opposite in the last two); while in *P. Roettleri* a third degree of ramification is met with, the branches of the first degree being placed three (sometimes four) in a whorl, but those of the second and third either singly or in pairs. The cells which bear these branches are either ordinary cells or spores, rarely "subsporal" cells (to be spoken of presently). The lateral branches, which are most usually single, have a tendency to grow on one side, but occasionally other ("accessorial") branches are found taking origin, not from a point near the top, but from some other part, often near the base, of the mother-cell. The rhizoid part consists, as has already been mentioned, in most cases of a single unbranched cell, though sometimes several-celled rhizoid parts are met with, and in two of the species these can occasionally produce spores. On the other hand, the rhizoid part is sometimes not even composed of

a whole cell, and only appears in the form of a basal protuberance from the mother-spores; while in *P. Cleveana* it is occasionally not developed at all.

The anatomical elements consist of vegetative cells and spore-cells. The former are either intercalated ("enclosed") or terminal, usually cylindrical in shape and thin-walled without layers; within is a parietal layer of protoplasm and a large central vacuole. Their breadth varies from 40-190^{mm}, and the length is generally 5-20 times the breadth. On further examining the contents, it is seen that some of the cells have a layer of chlorophyll-granules, the continuity of which is usually interrupted in certain parts, and sometimes to such a degree as to produce the appearance of a network; other cells, however, are almost deprived of chlorophyll, and have a much thinner parietal layer of protoplasm. In specimens which produce no spores, the green cells exist alone; but in spore-bearing individuals both coloured and colourless cells are found, the latter being the "subsporal" cells spoken of above. The terminal cells are either like the ordinary coloured cells (only longer), or else they are twisted and usually branched above, forming what the author calls "helicoid" cells. These helicoid cells are common only in *P. Cleveana*, but they are of occasional occurrence on all the other species, with the exception of *P. sumatrana* and *P. æqualis*. As they are filled with chlorophyll, they must have an assimilating function; but their form and a modification of their membrane evinced by its capacity to adhere to foreign substances, show that they are also organs of attachment. Reproduction takes place in two ways: by formation of spores, and, as the author quaintly expresses it, "by the bringing forth of prolific cells." The cell (only occasionally a terminal one) destined to spore-production, first widens at its upper part, then the protoplasm in this part is increased by apposition from within at the cost of the protoplasm in the lower portion, and this transference is participated in by the chlorophyll, which penetrates into the widened portion and fills up the great central vacuole in it. After all (or rather nearly all) the chlorophyll has become collected in the upper part of the cell, it is shut off from the colourless, almost empty subsporal cell by the formation of a transverse partition. Finally, the spore is prepared for its season of rest by the thickening of its wall, and the transformation of a part or all of its starch-grains (formed in the chlorophyll) into a brownish oil. Several deviations from this normal method are described: thus, the upper part of a cell destined to become a spore may not enlarge; or a considerable part of the chlorophyll may remain in the subsporal cell, which, under these circumstances, either branches or else produces twin (sometimes triple) spores; again, the spore may be formed in the lower part of the mother-cell. Moreover, sometimes in specimens of *P. Cleveana* where no rhizoid part is developed, a spore may occupy the same place as the mother-spore, and possess the same membrane as its parent except at its upper part.

The "prolific" cells are borne in most cases by sterile individuals; they are nothing more than ordinary cells packed with starch-grains, and being only provided with a thin membrane, are not adapted to undergoing a period of rest. They become disunited from the decayed elements in connection with which they were formed, but their isolation is not so

complete as to prevent two prolific cells remaining united and germinating in company, which latter process consists in the production of ordinary lateral branches, or occasionally, in addition to this, of a terminal spore-forming cell. Quite different is the germination of the spores, where an apical cell—the mother-cell of the cauloid part—is formed, and also the basal rhizoid cell, which is shut off by a transverse partition. The cauloid part grows by repeated division of the terminal cell, the intercalated cells not dividing (except very occasionally) but reproducing by branching or spore-formation, while the terminal cell rarely developes branches or spores.

In the production of branches the first thing seen is a small rounded process directed upwards and outwards, which resembles the *Bulbochæte*-branch in sometimes breaking through the outer part of the membrane. This process elongates, and, after a time, is seen to be divided off from the parent-cell by means of a wall usually placed somewhat obliquely with regard to the longitudinal axis of the young branch-cell, which itself divides when it has attained twice the length of the parent. It is usually only after completion of ramification that spore-formation commences; but that such is not always the case is shown by the fact that a cell can be seen to have changed from branch-forming to spore-forming, the rudiment of the branch remaining as a sort of beak at the side of the spore.

In the discussion of affinities, the author comes to the obvious conclusion that *Pithophoraceæ* are closely connected with *Cladophoreæ*, the main points of difference consisting in the nature of the rhizoid part and in the absence of zoospores, the place of which is apparently taken by the intercalated spores; this affinity is made closer if it be correct to consider the accessorial branches as morphological equivalents of the "rhizines" of *Cladophoreæ*. We venture to think that an additional consideration in favour of the view that *Pithophoraceæ* have been derived from *Cladophoreæ* (a view which the author maintains with much ingenuity) is furnished by the method of cell-division, which is manifestly a process derived from the—as Strasburger has shown—itself derived process which obtains with *Cladophora*. It only remains to add that no organs of sexual reproduction were met with, and to allude to classification, for the purposes of which the genus is divided into two sections. The first or isosporous contains 5 species, with spores all similar in form, viz., *P. sumatrana* (*Cladophora*, v. Martens), found in ditches at Palembang, Sumatra; *P. æqualis*, growing in small ponds on rocks near La Guayra, Venezuela; *P. Kewensis*, found in the Water-lily House at Kew, but most probably introduced from the tropics; *P. Œdogonia* (*Conferva*, Mont.), from Cayenne; and *P. Cleveana*, on moist earth under bushes at St. Thomas, West Indies. In the second or heterosporous section are comprised 3 species with several forms of spore: these are *P. polymorpha* (*Cladophora*, v. Martens) native of Mangalore, Canara; *P. Zelleri*, growing in rice-fields near Yokohama; and *P. Roettleri* (*Cladophora*, Kütz), found at Tranquebar, India.

We venture to suggest that *Blodgettia confervoides*, Harv., originally figured and described from Key West specimens, and recently announced by Dr. E. P. Wright from Bermuda (Quart. Jour. Micros. Sc., 1876, p. 342) may possibly be a congener. If

this surmise should prove correct, the name *Pithophora* will have to yield priority to *Blodgettia*. Unfortunately we can only surmise in the matter, for we have not access to the Chlorosperm part of Harvey's "Nereis Boreali-Americana." S. M.

Danish Fimicolous Fungi.

De Danske Gjodningssvampe, af E. C. Hansen. (Vidensk. Meddel. fra der Naturhist. Forening, 1876.) [With a French abstract.] Pp. 148, tab. 6.

This memoir comprehends an account of the Fungi found in Denmark growing on excrement, and is chiefly devoted to their classification, literature, and geographical distribution, but there are also various morphological and physiological observations. The previous literature of the subject appears to have been exhaustively worked up. Commencing with *Pilobolus*, the various genera containing fimicolous species are passed in review; those in countries other than Denmark are also enumerated. There are 12 species of *Agaricus*, and the same number of *Coprinus*. *Coprinus niveus* is treated in detail, and the development and structure of its sclerotia described. The latter are exceedingly variable in size, form, and colour; they possess a fine gray membrane on the outside which appears under the microscope as a granular mass composed of broken-down cells; beneath this is a black cortical portion in continuation with the former, and composed of many irregular rows of small thick-walled cells. This tissue passes gradually into the central portion made up of a pseudo-parenchyma with fine meshes, the intervals filled with air. The cells of this tissue are very irregular, and become gradually larger towards the centre; if the sclerotium be boiled with potash they are seen to form irregular cylinders branched and provided with numerous partitions; these interlace and form a firm, very close tissue. A dimorphism is noted in this species: in one form the pileus is covered with a felt-like, white, floccose down, and in the other with a snow-white, floury stratum; the first form developes solely from the sclerotium, the second never.

A new species of *Peziza* (*P. ripensis*) is described and figured, having been cultivated from sclerotia. Most of the *Ascobolei* grow on Mammalian excrement, about 40. *Ascophanus Holmskjoldii* is a new species, remarkable in the spores possessing appendages at either end. *Peziza coriacea*, Bull. (*Patellaria*, Fr., *Lecanidion*, Rabh.), is determined to be a monstrous form of *Poronia punctata*, Fr. There are two new species of *Melanospora* (*M. fimicola* and *M. aculeata*), one of *Sphærella* (*S. Schumacheri*), and three of *Sporormia* (*S. gigantea*, *S. pulchra*, and *S. pulchella*).

Of *Sordaria* 21 species grow on dung. The author here describes and figures 6 new ones, and in rearranging the genus on the principle of M. Winter, proposes two new sub-genera, in one of which the spores possess a round gelatinous appendix at the lower end, and in the other both ends are thus appendaged.

In an appendix a list, with remarks, is given of species which, though found on excrement, also grow on other substrata. Six beautifully executed plates illustrate the paper. H. T.

SOME POINTS IN BOTANICAL NOMENCLATURE.

Prof. A. De Candolle has addressed a letter to M. A. Cogniaux, of Brussels, in answer to one from that botanist requesting his opinion on certain points connected with botanical nomenclature, and the correspondence is published in the "Bulletin" of the Belgian Botanical Society (tom. xv., p. 477). The special cases stated by M. Cogniaux have reference to the proper authority to be appended to the names of species under the following circumstances which frequently occur:—1st. When an author founds a new genus on an old species, but does not actually place the new generic name in combination with the old specific name. 2nd. When an author enumerates several already known species as referable to a genus, either new or old, but (as before) does not give the combinations of names to designate each species. 3rd. When an author reduces one or more genera to synonyms under another genus, and the species of the former thus become species of the latter. In all these cases ought the new combinations of generic and specific names, which result from carrying out the ideas of the authors, to be followed by their names, as authorities? M. De Candolle's reply is prefaced by some remarks which appear very just and pertinent. He recalls to mind, what is too often forgotten, that the mention of an authority after a name is not an homage rendered to the author; it conveys neither praise nor blame, and is in no way connected with the merits of botanists; it is simply a reference. He observes that "most of the names made by an author may fall into synonyms, whilst his reputation may remain immense if he has shown himself exact, clear, judicious, and profound. On the other hand, the author of bad descriptions is placed in the lowest rank of botanists, though, either from an accident of time or because he has adopted the genera of a good author, his names may stand." "Thunberg is cited very much more often than R. Brown." He considers that the true principle which ought to decide all such cases as the above is this: "*Never to make an author say that which he has not said.*" Tried by this canon the answer to the question asked in relation to the above difficulties will be a negative one, for in no case has the author published the new combination necessary to characterise a species, and to attribute such to him is to make him say what he has not said In the first case, what the author has done is to refer a species to a new genus and to make a generic name. He has not said whether or not he approves of keeping up the old specific name; perhaps on further consideration he would have rejected it, because he would have considered it to contradict the characters of the new genus, or because in his view it ought not to be admitted in the old genus. In the second and third cases, instances are quoted showing how unjust it might be to attribute to an author specific combinations of names which he has never actually made. It would then frequently happen that an author would be made responsible for far more species than he allows to constitute his genus; whilst in other cases where there has been a union of several genera great confusion would arise from two or more very different plants bearing the same name. In this latter case it is impossible to know what names the author would have kept up or proposed, and he ought not to be cited for names

which he must have in part rejected. A point worthy of special note in the matter is this: that M. de Candolle assumes, as a basis of his argument, that an author who transfers a species to another genus is in no way bound to adopt the specific name which it previously bore.

These views of the distinguished botanist of Geneva appear to be based on so solid and just an appreciation of the real bearings of the question, that they will probably commend themselves to all engaged in systematic botany. The practice in this country, however, at present, especially with the Kew school, is partially inconsistent with the plain rule above given.

H. T.

THE BOTANIC GARDEN AT COPENHAGEN.

The old botanic garden at Copenhagen (Charlottenborg) has now been destroyed, a new and spacious one having been formed in the suburbs of the city. The Director, Prof. Lange, has therefore chosen a fitting time to publish, in a recent part of the "Botanisk Tidsskrift" (ser. 3, vol. i.), an account of the ancient institution which has thus started on a new phase of its existence.

The old garden dates from 1778, having itself succeeded the more ancient "Hortus medicus," founded near the University in 1660; this, however, was never of importance. The idea of its formation was chiefly due to the German botanist, Oeder, who was appointed Professor in 1754, and in 1771 commenced the "Flora Danica." He was succeeded by Rottböll in 1770, who, with Holmskjold, drew up a plan for the organisation of the garden, and in 1778 became the first director; Vahl, the disciple of Linnæus, being in 1779 appointed the first "reader." The latter celebrated botanist was afterwards director and Professor of Botany; he died in 1804. Hornemann, who succeeded, was director for nearly forty years, and was followed by Schouw (1841-52), and by Liebmann (1852-6). The small size of the garden (in 1857 no less than 9500 species were in cultivation in a garden of $2\frac{1}{2}$ hectares), surrounded with houses and in the middle of the town, at length rendered removal imperative. The removal was commenced in 1871.

The herbarium and library have always been in connection with the garden, and are now removed to a larger museum in the new establishment. The library, which consists of about 13,000 volumes, is founded on that of Oeder, to which have been since added that of Hornemann, and selections from those of Drejer, Schouw, Vahl, Liebmann, Vaupell, and Oersted. It contains also the MSS. of Vahl; and a collection of original drawings, including a series of copies from specimens in the Banksian herbarium made by Schumacher in 1788, during his stay in London, with transcripts of Solander's MS. descriptions, Oersted's drawings of Fungi, &c.

The herbaria consist of the old Brazilian collection of Marcgrav and Piso, Egede's Greenland plants, and Hofman-Bang's collection of Algæ; also separate herbaria for Europe (very rich in Italian species

from Schouw), for Denmark, and a large Arctic herbarium, containing Vahl's Greenland collections formed during a residence of eight years, Steenstrup's Iceland plants, &c.

The rich Mexican collections of Liebmann (1843) and Oersted's Central American plants (1849) are in course of being determined.

The general herbarium contains a small collection of Forskal, the herbaria of Rottböll, of Schousboe (Spain and Morocco), of Vahl (at the time of his death one of the finest in existence), of Schumacher (including Thonning's Guinea plants), of Isert (Guinea and Martinique), and of Hornemann. It is arranged by Endlicher's system. Among the Algæ are the types of Lyngbye's "Hydrophytologia Danica."

Botanical News.

Articles in Journals.—April.

Scottish Naturalist.—Rev. J. Fergusson, "Bryological Notes" (*Coscinodon Patersoni*, n.s.)—Id., "Botanical Ramble in Glen Shee."—W. G. Smith, "Structure of common Mushroom."—J. Roy, "Contributions to the Desmid-Flora of Perthshire" (*Penium rufo-pellitum*, n.s.).

Oesterr. Bot. Zeitschr.—G. Haberlandt, "Obituary notice of Hofmeister."—F. Hauck, "On the Algæ of the Adriatic."—E. Hackel, "On some Spanish and Portuguese Grasses."—L. Celakovsky, "Notes on flora of Bohemia" (contd.).—A. Kerner, "Hungarian plants" (contd.).—A. Oborny, "On flora of Moravia."—F. v. Thumen, "Answer to Hazslinsky on *Septosporium curvatum*."—V. von Borbas, "Botanical notes."—F. Antoine, "Botany of Vienna Exhibition" (contd.).

Bot. Zeitung.—L. Nowakowski, "Conjugation in some *Entomophthoreæ*."—O. Kuntze, "Preliminary report on study of *Cinchona*."—H. Hoffmann, "Experiments in cultivation."

Flora.—A. Batalin, "Mechanism of movements of insect-eating plants."—H. G. Holle, "On assimilation in *Strelitzia regina*" (contd.).—F. v. Thuemen, "Diagnoses of Thuemen's 'Mycotheca Universalis.'"—H. Leitgeb, "On the bilaterality of Prothallia."

Hedwigia.—N. Sorokin, "Cryptogamic flora of the Ural district."—G. Winter, "On *Sporodictyon turicense*" (with tab.).—G. Limpricht, "Hepaticæ of Tatra."

Nederlandsh Kruidkundig Archief (vol. ii., pt. 3).—M. W. Berjerinck, "Galls on Cruciferæ."—C. A. J. A. Oudemans, "Polygamous flowers in *Thymus Serpyllum*."—Id., "Addition to Fungus-flora of Holland."—M. Treub, "On growth in *Selaginella Martensii*."—T. H. A. J. Abeleven, "Additions to 'Prod. Fl. Bataviæ.'"—Oudemans, "Progress of investigation of flora of Holland" (Chronological Bibliography).

Bot. Tidsskrift (ser. 3, vol. i., pts. 3 and 4).—O. G. Pedersen, "On structure of the bark and passage from the primary to the

secondary growth of the stem in Labiates."—C. Groenlund, "On the structure of the caryopsis in various Gramineæ."

Botaniska Notiser.—H. W. Arnell, "Phenological observations in Sweden."—S. O. Lindberg, "*Cinclidium latifolium*, n.s."—M. J. Scheutz, "Review of Roses of Sweden and Norway."

Magyar Növénytanilapok.—J. Barth, "*Ephedra* in Transsilvania."—V. Borbas, "Can different plants have the same name?"—A. Kanitz, "Answer to the above."—G. Wolff, "Rare plants in flora of Torda."

Nuovo Giorn. Bot. (5 April).—T. Caruel, "Essay at a historical review of Botany."—T. Caruel and A. Mori, "Experiments on absorption of water by leaves."—A. Mori, "On structure of leaves of *Ericaceæ*."—T. Caruel, "On a singular behaviour of zoospores in *Cladophora*."—N. Pedicino, "On *Polyporus Inzengæ*, Ces. & De Not."—A. Fischer de Waldheim, "A new *Ustilagineæ*."—C. H. Godet, "*Rosa marsica*, n.s."—G. Archangeli, "Further on *Medicago Bonarotiana*."

New Books.—V. B. Wittrock, "On the development and systematic arrangement of the *Pithophoraceæ*, a new Order of Algæ." (Upsala. 6 plates.)—G. W. Bohnensieg and W. Burck. "Repertorium annuum Literaturæ Botanicæ periodicæ. Vol. 3. 1874." (Haarlem.)—E. Stahl, "Beitrage zur Entwickelungsgeschichte der Flechten. Heft. 1, ueber die geschechtliche Fortpfllanzung der Collemaceen." (Leipzig. 4 plates.)—"Kryptogamen-Flora von Schlesien, heransgegeben von F. Cohn. Band 1. Gefass-Kryptogamen von K. G. Steuzel, Laub- und Leber-mosse von K. G. Limpricht, Characeen von A. Braun." (Breslau. 11 mrk.)

A new edition of Dr. Hooker's "Students' Flora of the British Islands" is in the press.

We note the appearance of the first number of the "Journal of Forestry and Estates Management" (London: J. and W. Rider), a periodical to be devoted to the promotion of Forestry under all its aspects, and "a medium of intercommunication between those who are engaged in the interests and industries which relate to timber products." The varied contents of this first number do not include anything of a botanical character.

M. Micheli (who is now in this country engaged in monographing the *Hydrocharideæ*) has, in continuance of previous years, reviewed, in the Geneva "Archives des Sciences," the principal publications on Vegetable Physiology which have appeared during 1876.

The death is announced, on May 1st, at his house at Wimbledon, of John Russell Reeves, aged seventy-three. For thirty years of his life he was resident in Canton, and during this time paid attention to all branches of Natural History. He collected a herbarium, and was the means of introducing into our gardens several Chinese plants. In 1827 Lindley dedicated to him a new genus (*Reevesia*) of *Sterculiaceæ*.

We have also to record the death, on February 2nd, of Harland Coultas, some time Lecturer on Botany at Charing Cross Hospital, and the author of some elementary botanical works.

Original Articles.

NOTES ON SOME SUSSEX PLANTS.

By Hon. J. Leicester Warren, M.A.

During the last few years a decided impulse has been given towards a more extended knowledge of Sussex botany. Its Flora possesses in several aspects a peculiar interest, and it is daily becoming better known. It is singularly unfortunate that one of the greatest of our scientific field-botanists, Mr. Borrer, should have died without throwing into a collected form the vast knowledge which he possessed of the vegetation of his own county. Much, it is true, may be gleaned from his herbarium, and every year our modern botanists begin to appreciate more both the soundness and the acuteness of his observing faculties. Yet the lamentable fact remains that Borrer is known best at second-hand. In this respect he resembles Socrates, and an acute botanist of the present day who has inherited the reticence of his botanical master. All three seem to prefer that to other folks should be delegated the office of publicly enunciating their scientific views, of collecting and utilising their oral notes, of evolving their random sayings, and of applying their often semi-prophetic suggestions. On Mr. Hemsley has fallen the task of digesting and arranging into an outline of a county Flora all that vast *corpus* of raw botanical material which lies on the shelves at Kew in the Borrer Herbarium. The care and appreciative assiduity with which Mr. Hemsley has accepted this duty are evidenced by every page of his work on Sussex botany. To Mr. Borrer's previous results Mr. Hemsley has joined a wide personal experience of the flowering plants of his county. It is much to be regretted that the great mass of interesting information, which the "outline" pre-supposes and succinctly presents us with, could not be given in more detailed form to the botanical public. Still, Mr. Hemsley's work must be in the hands of all future workers as a valuable basis on which to found all onward attempts hereafter in constructing a more elaborate county Flora.

With this view I subjoin a few rough notes of comment on the "Outline of the Flora of Sussex," filling in here and there a district not previously recorded, and in a few instances, where my experience of a given species in the county does not quite square with Mr. Hemsley's, I have ventured to make some brief statement to that effect. I have also appended references to each of the two divisions, East and West Sussex, into which the county falls in Mr. Watson's "Topographical Botany." I then specify in which of Mr. Hemsley's seven districts the special plant occurs. These are—1. West Rother and Lavant. 2. Arun. 3. Adur. 4. Ouse. 5. Cuck-

mere. 6. East Rother. 7. Medway.* In other respects I think my notes will explain themselves. I shall commence, not by making a botanical record, but by commenting on an unexpected absentee—

Papaver dubium, L. I have never once found this Poppy anywhere on or near the coast in Sussex. The absence of a common species is, in a local Flora, always worth remark. *P. Rhœas*, *Argemone*, and *hybridum* are all three very prevalent about Brighton; this caused me to search repeatedly and in vain for *P. dubium*. I may add another strange absentee, viz., *Erysimum cheiranthoides*. The broken half-garden, half-field allotments which lie on the slope of the Race-course Hill behind Brighton give us all the plants with which *Erysimum* is in Surrey associated, and it is precisely the right kind of ground for it, yet it does not put in an appearance.

† *Sisymbrium Sophia*, L. East Sussex. Adur. On a sandy hedge-cop among the allotment fields near the Grand Stand on the Brighton Race-course, its grade being, I take it, more that of a colonist than of a native. This species is omitted in Hemsley, and its occurrence in East Sussex is queried in Topog. Bot.

Nasturtium sylvestre, Br. East Sussex. Ouse. Barcombe Mills, N. of Lewes. In the dense herbage of a tributary rivulet which runs between the river and the road, 50 yards E. of the Mills. Personal authority wanted in Topog. Bot.

Nasturtium palustre, DC. East Sussex. Adur. One plant on the south margin of the Mill Pool at Vale Bridge, north of Burgess Hill. Given as rare by Mr. Hemsley. Personal authority wanting for East Sussex in Topog. Bot. I have only once gathered this elsewhere common species in Sussex.

† *Sonebiera didyma*, Pers. West Sussex. West Rother. In a lane-side between Bognor and Barn Rock House. Not native, of course, but with nothing suspicious about this special station.

Viola hirta, L. West Sussex. Adur. Wood at Old Erringham, N. of Old Shoreham, &c. An accidental omission in Mr. Hemsley's Flora, corrected in his "additions." I give one out of several observed stations. It appears to be generally diffused on the chalk.

Helianthemum vulgare, Gært. East Sussex. Adur. Downs on the east side of the London Road, a little short of Clayton Tunnel, N. of Brighton. The East Sussex record is queried in Topog. Bot.

Frankenia levis, L. West Sussex. Adur. One patch, a yard broad, on the shingly beach opposite New Shoreham Church. Personal authority wanted in Topog. Bot. This must be decreasing on the Sussex coast, to judge by Mr. Hemsley's records. He seems to regard the species as generally diffused. He says: "All (districts) except Medway, but sparingly on some parts of the coast."

† *Saponaria officinalis*, L. East Sussex. Adur. Near the edge of a little wood at Burgess Hill Station, southwards. Not native. Adur wanted by Mr. Hemsley.

Stellaria glauca, L. West Sussex. Arun. Rather sparingly in

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* An Outline of the Flora of Sussex, by W. B. Hemsley, A.L.S. See appendix to J. of B. for 1875 (N.S., vol. iv.), and see subsequently some corrections for and additions to the above by the same writer in J. of B., for 1876, N.S. vol. v., p. 47.

the herbage of the trench sides in Amberley Wild Brooks, north of Amberley Castle. A local and confused species. (May always be got on Moulsey Hurst, Surrey, by any London botanist who desires to make its acquaintance.)

Spergularia marginata, Syme E.B. West Sussex. West Rother. Beech at Climping, west of Littlehampton. Adur. Coast at Aldrington Gate; again by the river (Adur) side at Old Shoreham.

Geranium columbinum, L. East Sussex. Adur. Cornfield edges on the east side of Brighton Race-course. Given as rare by Mr. Hemsley.

Anthyllis Dillenii, Schultz. East Sussex, Adur. By the road-side leading across the downs north of Rottingdean, and elsewhere. As I am responsible for this variety, or possible sub-species, as a Sussex plant in Mr. Hemsley's Flora, I here note its habitats again, and affix a few lines of explanation. I have recorded as *Dillenii* a smaller mountain form of the type, producing flowers deeply tinged with red. This, though nowhere very abundant, may be found here and again on most of the downs about Brighton eastward. It would be very desirable if some local botanist could procure examples with perfectly ripe fruit, in order to test if Professor Boreau's differential characters of true *Dillenii* are borne out by these Sussex down-side specimens. Their collection will require a little care, and could be best done by a resident botanist, as by the time the pod is ripe the colour of the flower is faded. Specimens should be marked in their flowering stage and re-sought later. Boreau's characters are—Pod more longly stipitate than in *A. Vulneraria;* apiculus curved (not straight).

† *Melilotus alba*, Lam. West Sussex. Adur. Not native, but has held its ground for many years high up among the rocky, broken chalk sides of the Hove Tunnel. This species should have the sign of dubious nativity affixed in Mr. Hemsley's Flora. He only gives Arun and Adur, two out of seven districts, for its occurrence. It is generally, in England, a plant of waste, rubbishy building-ground, casual in its appearances, and equally uncertain in its disappearances.

Potentilla procumbens, Sibth. East Sussex. Adur. Dry cop outside the wood on the south margin of Vale Bridge Pool. In these hybrid specimens *P. Tormentilla* predominates over *P. reptans*. Personal authority wanted for East Sussex in Topog. Bot. Mr. Hemsley gives no districts.

Rosa systyla, Woods. West Sussex. Adur. A fine bush may be seen just crossing the brook S. of the railway station at Bramber. Mr. Briggs writes, that he would so name a range of specimens sent by me from the above locality to the Exchange Club. The sub-species is only given by Mr. Hemsley for Cuckmere in the "Corrections."

Pyrus torminalis, Ehrh. East Sussex. Adur. Hedge on the left-hand side of the high-road going from Burgess Hill to Hayward's Heath, near where "Hook House" is marked on the Ordnance Map. East Sussex omitted in Topog. Bot.

Œnanthe Phellandrium,. Lam West Sussex. Adur. In great perfection in the trenches of the water-meadows adjoining Bramber Station. I give this habitat because Mr. Hemsley notes at this

species and *Œ. fluviatilis*—"These forms not defined, and the genus generally not worked out." Also East Sussex. Adur. Margin of Vale Bridge Pool.

† *Silybum marianum*, Gært. East Sussex. Adur. Some years ago this alien appeared very prominently and abundantly at Brighton, on the newly-deposited rubbish on which the beach-drive under the Marine Parade was subsequently made. Last year I could only observe one stray example. The sudden appearance of a manifest alien in any great quantity is always worth noting. Some day, I trust, the floras of our large towns will be scientifically treated. The present gradual spread northwards of *Diplotaxis muralis*, for example, quite deserves a monograph to itself.

Arctium majus, Schkuhr. West Sussex. Adur. Piecombe and Godstone bottom, both near Brighton. East Sussex. Ouse. In several places near Balcombe Station. Mr. Hemsley notes the forms of *Arctium* as imperfectly known in their Sussex distribution. He only gives Arun for the above.

Centaurea Calcitrapa, L. West Sussex. Adur. This is a most conspicuous weed at Brighton, though local enough in other parts of England. *Mercurialis annua*, *Carduus tenuiflorus*, *Diplotaxis muralis*, with it occupy nearly every bit of waste ground and rubbish about the town. One misses the *Erigeron canadense* of similar situations in suburban London. I suppose, it will reach Brighton soon, but I have not noticed it there yet.

Hieracium tridentatum, Fries. West Sussex. Adur. In the hedge bounding the common on the west at Henfield. A new district for Mr. Hemsley.

Calamintha menthifolia, Host. West Sussex. Adur. In hedge-cops of lanes near Broadwater, N. of Worthing. A new district for Mr. Hemsley. He only gives Arun and Cuckmere, and queries the occurrence of the species in the latter.

Scutellaria minor, L. East Sussex. Adur. In a small plash W. of and close to the railway-side, half a mile short of Vale Bridge Viaduct. Mr. Hemsley considers this species too common to enumerate its districts. Doubtless it will be found in all seven. Yet, I think, a station in each will be worth specifying in a future Sussex Flora.

Ballota fœtida, Lam. In this case Mr. Hemsley enumerates districts; surely they might here be left out.

Utricularia minor, L. West Sussex. Adur. Ditch by the road-side under Old Erringham Farm, N. of Old Shoreham. Mr. Hemsley gives only Arun, which he queries, but Cuckmere is added in the "Corrections." As it is important to have definite records for the county, I repeat one previously published by myself. (See Botanical Locality Record Club Report for 1875, p. 128.)

Plantago maritima, L. It is worth noting, that this is more a plant of the muddy sides of tidal rivers in Sussex than of the actual sea-board. The Plantain of the sea-coast is *P. Coronopus par excellence*.

Littorella lacustris, L. East Sussex. Adur. South margin of Vale Bridge Pool, under the wood, in the gravelly mud of the water's

edge. This district is not given in Mr. Hemsley's Flora. Apparently a local species in the county.

Chenopodium ficifolium, Sm. East Sussex. Arun. Occurs here and again on waste ground on the East Cliff, Brighton, on the rising allotment ground towards the Race-course, behind the town. Some fine specimens were also observed in the Steyne Enclosures as garden weeds. The species is omitted by Mr. Hemsley; and personal authority is wanted in Topog. Bot. for its occurrence in this vice-county.

Chenopodium murale, L. West Sussex. Adur. Near the Turnpike-gate at the wooden bridge across the Adur at Old Shoreham. The district not given in Mr. Hemsley's Flora.

Atriplex littoralis, L.; var. *b. marina*, Syme. West Sussex. Adur. Copiously on the coast, just outside Worthing, eastwards, near Balmerino Mills. Again near the "New Salts" Farm, between Lancing and New Shoreham. Mr. Hemsley does not give this variety separate enumeration. I venture, however, to chronicle its occurrence, as it is entered apart from *A. littoralis* in Topog. Bot. This sub-species is, at all events, of as much value as the parallel variation of *A. serrata* from *A. angustifolia*.

Atriplex serrata, Syme. West Sussex. Adur. Coppards Gap, W. of Brighton, on the hard shingly coast ground. I never noticed this before as a littoral plant. It here assumes a much fleshier habit than in its commoner congeners of inland cultivated ground. There is no record for Sussex in Topog. Bot.

Atriplex triangularis, Willd. West Sussex. Adur. In plenty near the gas-works at Aldrington Basin, W. of Brighton. I have ascertained, by a reference of specimens to Dr. Boswell, that this misunderstood form is sufficiently widely diffused on the coast of West Sussex. It is in fact merely stunted littoral *deltoidea*. The leaves are more entire, and resemble those of *Smithii*, from which, however, the denser spikes of smaller fruit sufficiently separate it.

Atriplex Babingtonii, Woods. East and West Sussex. West Rother. Arun. Adur. There is no lack of this protean Atriplex on the Sussex sea-board. Last autumn but one I studied the littoral aspects of the genus with some care, taking as my working ground the vicinity of the Aldrington Basin, near Hove, where every *Atriplex* given in Mr. Hemsley's list may be seen growing *in situ*, at the right time of year, within the compass of a mile. I am convinced that the key towards mastering this genus on the coast is *A. Smithii*, Syme. The botanist, who only knows *A. Smithii* inland, would hardly credit its range of littoral variation. When he has learnt that species in all its length and breadth, the rest will readily fall into order around it. Let the beginner assume that two out of every three specimens shore-gathered will be *A. Smithii*, and he will have got a good helping hint. The *crux* on the shore is, where *Smithii* ends and where obscure and untypical *Babingtonii* begins. Typical *Babingtonii* is most unmistakable, but it becomes less and less characteristic in the *Smithii* directions, till at last specimens are met with which really might be either. A good rough-and-ready rule, however, is, when in doubt, say *Smithii*.

Euphorbia platyphylla, L. East Sussex. Ouse. In a Potato-

patch in a field on Sunt Farm, one mile north of Hayward's Heath. Local in the county.

Populus tremula, L. East Sussex. Adur. Roadside, half a mile short of Vale Bridge Viaduct, towards Burgess Hill. Adur wanted by Mr. Hemsley.

Typha angustifolia, L. West Sussex. Trenches N. of Old Shoreham. Personal authority wanted in Topog. Bot. Evidently scarce in the county.

Potamogeton rufescens, Schrad. East Sussex. Ouse. Barcombe Mills. In the same rivulet as *Nasturtium sylvestre*, Br. (q. v.). Personal authority wanted in Topog. Bot. On first getting some specimens of *Potamogeton* out of the water at the point above indicated, I thought I had hit upon *P. heterophyllus*, Schrad, a plant which I know well in Surrey, Hants, and Cheshire. Still, not being quite satisfied, I sat down on the bank; and after fishing for a quarter of an hour, I found that *P. lucens*, L., and *P. rufescens* were growing in this rivulet densely intermixed. I had not Mr. Hemsley's Flora with me, but on opening it at my return, I found the following curious corroboration of the doubts through which I had passed: "? *P. heterophyllus*, Schrad. Ouse. Near Balcombe, Lloyd and McEnnes, very doubtful." This is rather a long story, but is not uninstructive as to the manner in which botanical records are confused.

Potamogeton lucens, L., var. *acuminatus*, Reich. West Sussex. Adur. In the brook in the water-meadow S. of Bramber Station. I do not attach much importance to this var., but extreme specimens may be readily procured at the above station. In most the spine or midrib is very prominently excurrent; in some the leaves are reduced to mere midribs. I should be glad of a well-ripened specimen in fruit, if this record leads any botanist to the spot rather later in the year than I visited it.

Zannichellia palustris, L. West Sussex. Adur. Pond at Sompting, N. of Worthing. The nearest point to the open coast at which I have got the fresh-water form. East Sussex. Adur. In a circular "pit" in a field just outside Burgess Hill, by the road leaving it N.E. The water unusually clear for the occurrence of the type. My experience of it is a plant of muddy-bottomed ponds and pools. *Z. pedicillata* of *clear* brackish trenches. East Sussex. Ouse. Small roadside plash between the station and mill at Barcombe; good and typical here.

Zannichellia pedicellata, Fries. West Sussex. Adur. Lower Lancing trenches. East Sussex. Ouse. Lewes Levels. It seems worth while to throw together my experience of these segregates in their separate distribution in Sussex. It is a tiresome and uninviting genus except to a specialist. Two of these records have been already printed. See Botanical Record Club Report for 1875, p. 131.

Juncus glaucus, Sibth. I see that Mr. Hemsley enumerates the comital districts of Sussex in which this occurs, while for *Juncus obtusiflorus*, Ehrh., he does not do so. The last I have never seen in Sussex. The former seems to me quite one of the commonest species in the county. It is curious how our county Floras seem to follow each other in voting *J. obtusiflorus* a common plant. It is, all the same, a most sparsely distributed and local species. Mid-England,

Warwickshire, Oxfordshire, and their contiguous counties, are its head-quarters. It selects canal banks and grassy inland valleys. On the actual coast I never saw it.

Scirpus acicularis, L. East Sussex. Adur. South margin of Vale Bridge Pool. Mr. Hemsley gives no districts. I think the stations of this easily-overlooked species worth entering.

Carex ovalis, Good. Omitted, I suppose by accident, in Mr. Hemsley's list. It is, of course, common in Sussex, as elsewhere. I have seen it on Vale Bridge Common; in meadows near the toll-gate between Shoreham and Worthing, &c. The former record falls in Adur, the latter in Ouse. In supplementing a species, however common, a distinct station is always advisable.

Alopecurus fulvus, Sm. East Sussex. Adur. Sparingly on the south margin of the Mill Pool at Vale Bridge, north of Burgess Hill. One or two specimens were in good flower, and showed the unmistakable deep glaring orange anthers. Topog. Bot. gives no East Sussex record.—(N.B. Any London botanist can see the species just now in great perfection on Wandsworth Common.)

Gastridium lendigerum, Gaud. West Sussex. Adur. Sparingly near the Old Aldrington Toll-gate, on the shingles, a little W. of Hove.

Poa compressa, L. East Sussex. Adur. In the wall-coping of a newly-built church near St. John's Common, Burgess Hill. Omitted by Hemsley for the county, but entered without districts in the "corrections." Given in Topog. Bot. for the vice-county on an old record of Mr. Coleman's.

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. Holmes, F.L.S.

(*Continued from* p. 178.)

Fissidentaceæ.

Fissidens bryoides, *Hedw.* *Dicranum bryoides*, Smith.

On shady banks, woods, &c. Common. February, March. Bry. Eur. i., t. 101.

Abbey Wood; Sevenoaks; Otford; &c.

Distinguished from *F. pusillus* by the axillary gemmiform barren flowers, and by the dorsal wing being continued down to the base of the leaf.

F. exilis, *Hedw.* *F. Bloxami*, Wils. (Bry. Eur.)

On damp bare clayey soil in woods and thickets. February, March. Bry. Eur. i., t. 100.

Damp clayey bank in a thicket on the right-hand side of the road between Keston Common and Down; *W. W. Reeves*, 1874!

Distinguished by its minute leaves without a border, but toothed at the edges.

F. pusillus, *Wils.* *F. viridulus*, β. *pusillus*, Bry. Brit.

On damp sandstone or greensand rocks in shady places. Rare. August, September.

On greensand boulders in Cossington Spring, near Maidstone.
Known from *F. bryoides* by the terminal barren flowers, and by the dorsal wing ceasing near the base of the leaf. It is a very small species.

F. INCURVUS, *Schwgr.*
On shady banks. Not uncommon. February. Bry. Eur. i., t. 99.
Hayes Common.
var. *β. fontanus*, Wils.
In a spring on Miss Post's estate, near Maidstone.
Known from the last by the curved capsule and the gemmiform barren flower situated at the base of the stem.

F. ADIANTOIDES, *Hedw.*
On damp chalky banks and in dripping places. The fruit not common. November to February. Bry. Eur. i., t. 105.
Otford ; Wrotham.

F. TAXIFOLIUS, *Hedw.*
On damp shady banks in open places in woods, &c. Frequent. Fruiting freely on the chalk. November to February. Bry. Eur. i., t. 104.
Maidstone; Bidborough; Otford. In fruit in each station, abundantly in the last.

Hookeriaceæ.

PTERYGOPHYLLUM LUCENS, *Brid. Hookeria lucens*, Smith (Wils. ; Berk. ; Hobk.).
In damp shady places near streams in hilly woods. Rare. Bry. Eur. v., t. 448.
Hungershall Rocks, near Tunbridge Wells ; *Fl. T. Jenner.* Bigberry Woods, near Canterbury, in fruit; wood near Southborough.

Fontinalaceæ.

FONTINALIS ANTIPYRETICA, *L.*
In streams. The fructification rare. June, July. Bry. Eur. v., t. 429.
In the river Darenth, between Eynsford and Farningham; *Howse!* Not observed in fruit.

Neckeraceæ.

Tribe 1. *Leucodonteæ.*

CRYPHÆA HETEROMALLA, *Brid.*
On trunks of trees. Not common. May, June. Bry. Eur. v., t. 438.
Trees west of Buckland Church ; Dillwyn, 1805, *Bot. Guide.* Edenbridge ; Chilstone Park, near Lenham ; Otford ; Penny Pot Woods, near Canterbury.

LEPTODON SMITHII, *Brid. Pterogonium Smithii*, Swartz (Bot. Guide).
On trees especially of Sycamore and Chestnut. Rare. April. Bry. Eur. v., t. 439.
Trees in Waldershare Park, near Dover, plentifully (in the same place, sparingly, 1877 !); a little north of the halfway house

between Dover and Canterbury; *Bot. Guide.* Barham Downs; *D. Smith.*

LEUCODON SCIUROIDES, *Schwg.*

On trunks of trees. Very rare in fruit. November. Bry. Eur. v., t. 468.

Tunbridge; Edenbridge; Penshurst, frequent; Sevenoaks; Postling; Ashford; Maidstone; Sibertswold; Dover, not observed in fruit.

ANTITRICHIA CURTIPENDULA, *Brid.*

Usually on alpine rocks; occasionally on trees in subalpine regions. Very rare. April. Bry. Eur. v., t. 469.

Lydd Beach, in great abundance, covering the small bushes with luxuriant tufts. (This locality is an unusual one for this Moss, being not more than twenty feet above the sea-level. I have found it in a similar situation on Dawlish Warren, in Devonshire, but very sparingly. The plant is of much more luxuriant growth at Lydd Beach than on trees in Ashdown Forest, where it has a somewhat starved appearance.)

Tribe 2. *Neckereæ.*

NECKERA CRISPA, *Hedw. Hypnum crispum*, L.

On chalky hills and banks. Frequent. November, April. Bry. Eur v., t. 443.

Banks of Thames near Northfleet and Gravesend; D. Doody, *Ray. Syn.* iii., p. 82, n. 47. Morant's Court Hill and elsewhere on the chalk, frequent; *Jenner Fl. Tunbr.* On the Warren, Folkestone, abundant; in a quarry near Charing.

N. COMPLANATA, *Br. & Sch.*

On trunks of trees near the base, and on old stumps. Frequent. November, December. Bry. Eur. v., t. 444.

Abbey Wood; in fruit near Otford; Ightham.

N. PUMILA, *Huds.*

On trunks of trees. Not common. September, October. Bry. Eur. v., t. 442.

Dunton Green, in fruit; *George!* Edenbridge; Otford; Charing.

HOMALIA TRICHOMANOIDES, *Br. & Sch. Omalia trichomanoides*, Brid. (Wils.; Hobk.)

On trunks of trees near the base, in shady woods, and on shady rocks near water-courses. Not common. October, November. Bry. Eur. v., t. 446.

Greenhithe; Otford; Boughton Monchelsea; on the Kentish side of the stream opposite the High Rocks.

Leskeaceæ.

LESKEA POLYCARPA, *Ehrh. Hypnum medium*, Dicks. (Jenner Fl. Tunbr.)

On the roots of Alders and other trees by the sides of rivers, and in places liable to inundation. Frequent. May. Bry. Eur. v., t. 470.

Tunbridge; *Jenner Fl. Tunbr.* Penshurst; Great Dundale Wood, near Tunbridge Wells.

ANOMODON VITICULOSUS, *Hook. & Tayl. Hypnum repens trichoides arboreum majus, capitulis et surculis erectis, minus ramosis*, Ray. Syn. iii., p. 85.

On shady rocks, chiefly of a calcareous nature, and on stumps of trees. Common. Rare in fruit. February. Bry. Eur. v., t. 476.

On chalky hills between Northfleet and Gravesend; *Ray. Syn.*, l.c. Southfield Park, near Tunbridge Wells; Plaxtol; Morant's Court Hill; very fine at Westerham (in fruit?); in 1842; Mr. R. Scott, *Jenner Fl. Tunbr.* Abbey Wood; in fruit near Charing.

HETEROCLADIUM HETEROPTERUM, *Bry. Eur. Hypnum heteropterum.* Bruch. (Wils.; Hobk.)

On damp shady rocks in hilly districts. Rare. November. Bry. Eur v., t. 480.

Between Sevenoaks and Ide Hill, near the spot where *Plagiothecium latebricola* grows.

From *Eurhynchium pumilum*, which it resembles in habit, this species is known by its papillose leaves with broader cells.

THUIDIUM ABIETINUM, *Br. & Sch. Hypnum abietinum*, Dill. (Wils.; Hobk.; Jenner Fl. Tunbr.)

In shady grassy places on chalk hills. Common, not found in fruit. May, June. Bry. Eur. v., t. 485.

Kent; Sir. J. E. Smith, *Bry. Brit.* Morants Court Hill, abundant; *Jenner Fl. Tunbr.; Mitten.* About Northfleet and Gravesend; *Fl. Metr.* Otford, abundant; Bluebell Hill, near Maidstone; Wrotham; Greenhithe; abundant near Long Beech Wood, Charing.

This plant, which is abundant on the chalk, is the form described by Mitten under the name of *Thuidium histricosum.* It is distinguished from the typical form by the longer loosely appressed leaves, and by the ovoid, not round outline of the leaf-cells. (See Journ. Bot., 1863, p. 357.)

T. BLANDOVII, *Br. & Sch. Hypnum Blandovii*, Web et Mohr. (Wils.; Berk.; Hobk.; Jenner Fl. Tunbr.)

In bogs. Very rare. May, June. Bry. Eur. v., t. 486.

Tonbridge; Mr. Joseph Woods, *Bry. Brit.*

The occurrence of this Moss in Kent is open to doubt. In Hooker's English Flora v., pt. i., p. 88, it is described as occurring "on rocks in subalpine countries. Tonbridge, Mr. Joseph Woods." In Jenner Fl. Tunbr. the following remark occurs: "This is said by Hooker to have been found 'on the rocks at Tunbridge' by Mr. Joseph Woods. Diligent and repeated search has been made for it without success." It is undoubtedly a bog species, *Huds. Fl. Ang.* Chalk cliffs near Gravesend; Dillenius, 1762, and if found near Tunbridge would probably occur in boggy ground in the forests in Sussex.

T. RECOGNITUM, *Hedw. Hypnum delicatulum*, L. (Wils.; Hobk.) *Thuidium delicatulum*, Sch. (Berk.)

In shady grassy places on chalky hills. Rare; the fruit not observed in Kent. June, July. Bry. Eur., t. 484.

On Bluebell Hill, near Maidstone, sparingly.

This species closely resembles the next in habit, but the pinnæ are

simply pinnate only, and the terminal cell of the leaf is crowned with acute papillæ; the perichætial leaves are not ciliate.

T. TAMARISCINUM, *Bry. Eur.* *Hypnum tamariscinum*, Hedw. (Wils.; Hobk.) Bry. Eur. v, t. 482, 483.

In woods and thickets on damp shady banks. Common. November.

Abbey Wood; King's Wood, near Maidstone; Boughton Monchelsea.

Hypnaceæ.

CLIMACIUM DENDROIDES, *Web et Mohr.*

In wet sandy places near streams, &c. Rare. Not observed in fruit. Bry. Eur. v., t. 437.

Sands near Deal; *W. Mitten.* Among the sandhills and damp ground near the sea, Sandwich, abundantly.

The form which grows in this locality is very stunted, little more than the terminal tufts of branches being visible above ground.

ISOTHECIUM MYURUM, *Brid.*

On stones, rocks, and roots of trees. Frequent. Bry. Eur. v., t. 533.

Dunton Green; Sevenoaks; near Brastead, in fruit.

HOMALOTHECIUM SERICEUM, *Br. et Sch.* *Leskea sericea*, Hedw. (Wils.; Hobk.)

On trees and walls. Very common. November, March. Bry. Eur. v., t. 456.

Abbey Wood; Sevenoaks; Otford; Maidstone, &c.

CAMPTOTHECIUM LUTESCENS, *Br. et Sch.* *Hypnum lutescens*, Huds. (Wils.; Hobk.)

Hypnum repens, trichoides terrestre luteo virens vulgare majus capitulis erectis, Ray. Syn. iii., 84.

On chalky and limestone banks. Fruiting freely in damp places on the chalk. December.

Abundantly on chalky hills between Northfleet and Gravesend, *Ray. Syn.*, l.c. On the bank at Southfield Park, by the roadside from Tunbridge Wells to Southboro'; *Jenner Fl. Tunbr.* Bluebell Hill, Maidstone; on the Undercliff at Folkestone, and in a chalk quarry near Charing, in fruit abundantly.

This species and the last were both included in Ray's description, but he points out that the species growing between Northfleet and Gravesend was found on the ground, and was possibly distinct from the other form growing on walls.

BRACHYTHECIUM SALEBROSUM, *Schpr.* (Hobk.)

On damp sandy soil, usually near the sea. Rare. October, November. Bry. Eur. vi., t. 549.

Var γ. *palustre*, Schp. Syn., ed. 2. *Hypnum mildeanum*, Sch. Syn., ed. 1.

On marshy spots among the sandhills near Deal, sparingly.

B. GLAREOSUM, *Br. et Sch.* *Hypnum glareosum*, Br. (Wils.; Berk.; Hobk.)

On dry grassy banks in shady places or in woods, especially in chalky or limestone districts. Frequent. November. Bry. Eur. vi., t. 552.

Chalky banks near Wye; King's Wood, and on a stone wall at Tovil, near Maidstone; Otford.

This species is readily distinguished from *C. lutescens* by its prostrate habit, greyish-green colour, and by the leaves having very long points twisted at the end.

B. ALBICANS, *Bry. Eur.* *Hypnum albicans*, Neck. (Wils.; Berk.; Hobk.)

On sandy grassy places, and on sandhills near the sea. Frequent; the fructification rare. November, December. Bry. Eur. vi., t. 553.

Tunbridge Wells; *Jenner Fl. Tunbr.* On a cottage roof, Shoreham, very fine; *Howse!* Bostol Heath, near Plumstead; St. Paul's Cray Common, near Penshurst Station; Ightham Common; Rusthall Common; in fruit abundantly on sandhills near the sea, Deal.

This species may be recognised by its erect cylindrical stems, which are scarcely branched, and by the pale colour of its entire leaves. The specimen from Ightham differs from the type in being creeping and slightly pinnated, with the leaves somewhat secund.

B. VELUTINUM, *Br. et Sch.* *Hypnum velutinum*, Dill. (Wils.; Berk.; Hobk.)

On hedgebanks, roots of trees, stones, &c., especially in sandy districts. Frequent. December to February. Bry. Eur. vi., t. 538.

Abbey Wood; Halstead; Otford; Ightham, &c.

B. RUTABULUM, *Br. et Sch.* *Hypnum rutabulum*, L. (Wils.; Berk.; Hobk.)

Common everywhere, on trees, hedgebanks, walls, &c. November, December. Bry. Eur. vi., t. 543.

Greenhithe; Halstead; Otford; Southboro', &c.

B. POPULEUM, *Br. et Sch.* *Hypnum populeum*, Hedw. (Wils.; Berk.; Hobk.; Jenner Fl. Tunbr.)

On stones, walls, and trunks of trees in shady places. Not common. November, December. Bry. Eur. vi., t. 535.

On stones on the hill above Westerham; *Jenner Fl. Tunbr.* Hothfield; Ightham.

This species usually forms prostrate tufts, and the capsules are short and roundish.

B. PLUMOSUM, *Br. et Sch.* *Hypnum plumosum*, Swartz. (Wils.; Berk.; Hobk.)

On rocks and stones in streams or damp shady places, usually in subalpine districts. Rare. October to March. Bry. Brit., t. 25.

On damp sand-rocks, Ightham, in fruit.

This species has an erect habit, the branches being from half to one inch high, and the leaves are somewhat secund.

SCLEROPODIUM CÆSPITOSUM, *Schpr.* *Hypnum cæspitosum*, Wils. (Wils.; Berk.; Hobk.; Jenner Fl. Tunbr.)

On the roots of trees growing by rivers and subject to inundation; and sometimes on damp limestone walls. Frequent. November, December. Bry. Eur. vi., t. 559.

About the roots of trees within reach of floods, Tunbridge; *Jenner Fl. Tunbr. Supplt.* On walls at Boughton Monchelsea, and at Sandling, near Maidstone; very fine and abundant about Penshurst, on trees by the riverside; the fruit not observed in Kent.

This species when wet much resembles *S. illecebrum* and *Eurhynchium crassinervium*. From the former it is known by the upper leaves tapering considerably, and from the latter by the leaves not being suddenly acuminate.

S. ILLECEBRUM, *Schpr.* *Hypnum illecebrum*, Schwgr. (Wils.; Berk.; Hobk.)

On sandy grassy hedgebanks and on stone walls, or on earth-covered rocks in hedgebanks. Frequent; the fruit very rare. November to February. Bry. Eur. vi., t. 557.

Near Sevenoaks and other places, abundant; *Jenner Fl. Tunbr.* Keston Common; *Howse!* Hayes Common; Swanscombe Wood, near Clubber Lubber Hole, abundantly; Ightham; Lenham; Postling; Lydd Common; in fruit in a lane near Rusthall Common, on the Kentish side of the river.

EURHYNCHIUM MYOSUROIDES, *Sch.* *Isothecium myosuroides*, Brid. (Wils.; Bry. Eur.) *Hypnum myosuroides*, L. (Berk.; Hobk.)

On trunks of trees near the roots and on rocks. Common. November. Bry. Eur. vi., t. 534 (*Isothecium*).

Abbey Wood; near Ide Hill, in fruit.

E. CIRCINNATUM, *Br. et Sch.* *Hypnum circinnatum*, Brid. (Wils.; Berk.; Hobk.)

On shady limestone walls and banks, chiefly near the sea. Very, rare. Not found in fruit in Britain. March. Bry. Eur. v., t. 521.

On limestone rock above the canal near Hythe, very sparingly.

When wet this Moss looks like a small form of *Pterigonium gracile*, but when dry its short curved wiry branches and dull green leaves readily distinguish it from its allies.

E. STRIATUM, *Br. et Sch.* *Hypnum striatum*, Schreb. (Wils.; Berk. Hobk.)

In woods and hedges. Common. December. Bry. Eur. v., t. 523. (*E. longirostre*, Br. et Sch.)

Darenth Wood; Ashover Wood; Maidstone; Boughton Monchelsea, Hythe; Lenham.

E. CRASSINERVIUM, *Sch.* *Hypnum crassinervium*, Tayl. (Wils.; Berk.; Hobk.)

On limestone walls and banks in chalky woods. Frequent. November to February. Not common in fruit. November to February. Bry. Eur. v., t. 529.

Boughton Monchelsea; on a wall near Ightham; Lenham; Egerton; in fruit sparingly, Cossington, near Maidstone, and Dunton Green; abundantly in fruit in a wood near Otford.

Readily known by its suddenly acuminate leaves.

E. PILIFERUM, *Bry. Eur.* *Hypnum piliferum*, Schreb. (Wils.; Berk.; Hobk.)

In damp woods and thickets. Frequent. November. Bry. Eur. v., p. 531.

Hungershall Rocks; *Jenner Fl. Tunbr.*
Abbey Wood; Greenhithe, abundant; Otford; Postling, &c.
Resembles *H. cuspidatum* in appearance, but the tips of the branches are pale and shining, and the leaves are hair-pointed.

E. PRÆLONGUM, *Sch.* *Hypnum prælongum*, L. (Wils.; Berk.; Hobk.)
On banks and in woods, very common. December. Bry Eur. v., t. 526.
Otford; Maidstone; Dover; Abbey Wood; Northfleet; Ightham and Halstead, in fruit.

E. HIANS, *Hedw.*
On sandy banks. Not common.
Postling; Halstead.
Very similar in appearance to *E. Swartzii*, but is of looser habit, and the cells of the leaves are larger.

E. SWARTZ. *Hypnum Swartzii*, Turner (Wils.; Berk.; Hobk.)
Damp banks in lanes, hedges, and woods. Frequent. November to February. Bry. Eur. v., t. 524.
Otford; *Howse!* Maidston; in fruit at Abbey Wood; Dunton Green; Greenhithe; and Long Beech Wood, near Charing.

E. PUMILUM, *Sch.* *Hypnum pumilum*, Wils.
Damp shady banks in woods and hedges. Frequent, the fruit not common. December. Bry. Eur. v., t. 525 (*E. prælongum*, var. *β*.)
Abbey Wood; Greenhithe; in fruit near Keston.
Very similar in size and habit to *H.* (*Amblystegium*) *serpens*, but it has leaves in two rows, and a rough fruit-stalk.
[*Hyocomium flagellare*, Br. et Sch., which is abundant in a stream near Crowborough, in Sussex, should be looked for near Southborough, or similar localities, in Kent.]

RHYNCOSTEGIUM TENELLUM, *Br. et Sch.* *Hypnum tenellum*, Dicks. (Wils.; Berk.; Hobk.)
On old walls in shady places, sometimes on trees. October and December. Bry. Eur. v., t. 508.
On old walls at the Priory, and other walls about Dover, Dillwyn; *Bot. Guide.* Westerham; Morant's Court Hill, Westerham; frequent on the chalk; *Jenner Fl. Tunbr.* On a tree between Gravesend and Northfleet; Hothfield; Otford; Shoreham, abundant.

R. CURVISETUM, *Sch.* *Hypnum Teesdalii*, Smith (Wils.)
On rocks and stones in wet shady places. Rare. December. Bry. Eur. v., t. 509 (*R. Teesdalii*).
In the stream below Saltwood Castle, near Hythe.
Known from the last by its rough fruit-stalk and minutely serrate leaves, and from *E. Teesdalii* by its leaves being nerved only halfway, and by the capsule having a distinct neck and longer lid.

R. DEPRESSUM, *Br. et Sch.* *Hypnum depressum*, Br. (Wils.; Berk.; Hobk.)
On calcareous stones, on slopes, in woods. Not common. October. Bry. Eur. v., t. 512.

Dunton Green; Halstead; on the banks of the stream below Saltwood Castle, near Hythe.

R. CONFERTUM, *Br. et Sch.* *Hypnum confertum*, Smith (Wils.; Berk.; Hobk.)

On roots of trees, and on stones in hedgebanks and thickets. Common. November, February. Bry. Eur. v., t. 510.

Hayes Common; Beechborough, near Sandgate; Tovil, near Maidstone.

(To be continued.)

ON *SPORTELLA*,* A NEW GENUS OF ROSACEÆ.

By H. F. Hance, Ph. D., etc.

Flores hermaphroditi. Calycis persistentis tubus hemisphæricus, carnosus, lobi 5, triangulari-semiovati, mucronulati, erecti, valvati. Petala? Stamina 15 v. plura, calycis fauci inserta, uniseriata, filamentis subulatis, basi parum dilatatis. Discus tenuis, glaberrimus, obsolete sulcatus, calycis tubum vestiens. Folliculi 3-5, ossei, oblongo subtrigoni, ad medium usque tubo calycino immersi, inter se liberi, leves, castanei, nitidi, apice rotundati, stylo brevi apiculati; sutura ventrali dehiscentes, 1-spermi, semine altero abortivo. Semen e basi loculi adscendens eumque replens, compresso-piriforme, testa membranacea, raphe elevata; albumen nullum; cotyledones oblongæ, plano-convexæ; radicula brevis, infera.—Fruticulus austro-chinensis, ramis flexuosis, angulatis, glaberrimis, spinis rectis armatis. Folia ad nodos breves e spinarum axillis ortis, more *Caraganarum*, fasciculata, petiolata, glaberrima, coriacea, oblonga, obtusa, leviter et remote pauci-crenata, supra olivaceo-viridia, lucida, venis impressis, subtus pallida, opaca, costa prominula. Stipulæ? Flores in cymulas (v. corymbulos †) axillares, laxas, paucifloras digesti, longius pedicellati, bracteolis deciduis suffulti.

S. atalantioides, spec. unica.—Secus amnem Lien chau, provinciæ Cantonensis, supra pagum Tai wan, m. Octobri 1876, leg. Rev. J. C. Nevin. (Herb. propr. n. 19960.) Folia 1-1¾ poll. longa, 7 lin. lata, petiolo 2-3 lineali; cymulæ pollicares; calyx fructiger 1½ lin. diametro, flavus, pedicello 3-lineali suffultus.

It is to be regretted that the flowers of this curious and interesting plant are as yet unknown, for its exact position in the Order to which it belongs is uncertain; but they would not, perhaps, very materially aid in determining the question, as the absence or presence of petals, and their character, if existing, are nearly all we should learn from them. My valued friend, Dr. Thwaites, after inspection of the fruiting-calyx alone, regards it as evidently belonging to the *Spiræa*-group, and is disposed to refer it to *Exochorda*; whilst Prof.

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* Nomen, apud Romanos, vasculi in quo fructus apponi solebant, ab calycis fructigeri formam et adspectum.

† Ordo evolutionis ex speciminibus fructiferis haud satis liquet.

Oliver, who kindly examined similarly imperfect fragments, writes me :—"I think it probably a near ally of *Stranvæsia* (in which, however, the consolidation of the carpels is much more complete), and *Osteomeles*. It can hardly be a 1-seeded *Spiræa*, having an inferior radicle : the extent to which the carpels appear to be adnate to the 'calyx-tube,' too, would seem to keep it away from other genera allied to *Spiræa*." It is naturally with extreme hesitation that I venture to express a disagreement with the opinion of so practised a botanist as Prof. Oliver ; but in this case I find it impossible to accept his view. The texture and venation of the foliage of *Sportella* certainly resemble those of *Rhaphiolepis*, and are unlike those of *Spiræa* or its immediate allies ; but so far as I am acquainted with *Pireæ*, either from actual study of the plants themselves, or from Prof. Decaisne's masterly "Mémoire sur la famille des Pomacées," that tribe comprises no genus with perfectly distinct follicular carpels ; whilst a uniseriate arrangement of the stamens is also exceptionally rare in the group. The genus is undoubtedly quite distinct from *Exochorda*, of which I have just been enabled to examine wild specimens kindly sent me from Chinkeang by Mr. W. G. Stronach, by its totally different habit and foliage, its persistent calyx, very much smaller ovoid carpels, without any tendency to cohesion,* and ascending ovules. Nevertheless, I concur with Dr. Thwaites in regard to its tribual position, the apocarpous follicular fruit appearing to me of preponderating weight in deciding the question of affinity. The genus *Emplectocladus* † has coriaceous leaves, arranged in a fasciculate manner on short knob-like branchlets ; in *Gillenia* the ovules are ascending ; and the inclusion of the fruit of *Stephanandra* ‡ in the calyx-tube may be regarded as in some degree an approach to its immersion in that organ in *Sportella*. It is true that the foliage of our plant is very different from that of *Spiræa* and its allies ; but if, as I would suggest, *Quillaieæ* be merged in *Spiræeæ*, and there are in reality no distinctive characters to maintain them apart,§ this objection would vanish.

SHORT NOTES.

Rare Scotch Plants.—*Lepigonum rupicola*, Kindb. Rocks by sea-shore, Kirkandrew, Kirkcudbright, in some quantity. August 6, 1868.—*Agrimonia odorata*, Mill. Glen Ashdale or Eaisdale, Island of Arran, August 16, 1869. Since the above date I have found the plant at Conygills, King's Cove, and other places in the island. I am not aware of any other Scotch stations.—*Carduus arvensis*, var. *b*.

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* The fruit of *Exochorda* is well figured by Prof. Baillon. (Hist. des plantes, i. 400.)

† Torrey, Plant. Frémont., t. 5. Recently reduced to *Prunus* by A. Gray. (Proc. Amer. Acad. Sc. x. 70.)

‡ Sieb. and Zucc., Abhandl. München. Akad. iii., t. 4, f. 2.

§ Cfr. Benth. and Hook. f., Gen. Plant. i. 603 ; Baillon, Hist. plant. i. 442. The latter author removes *Exochorda* from *Spiræeæ*, where it is stationed by Bentham and Hooker, to *Quillaieæ*.

setosus. Roadside, West of Edinburgh, in large quantity, July 14th, 1874. I have known this station for about eight years past, but for some time had no chance of observing the plant in flower.—*Hieracium pratense*, Tausch. Roadside to the East of Edinburgh, in quantity, June 20th, 1876.—A. Craig-Christie.

Vegetable "Eider-down."—I quote the following from a letter dated December 30, 1873, from the Rev. James Graves, Secretary to the Royal Irish Archæological Association.—"Mrs. Graves bought a so-called Eider-down quilt the other day. On opening it the down was found to be as the sample enclosed. Is not this the down of the Cotton-rush so conspicuous in our bogs?" It is certainly the down of *Eriophorum*, but I have not determined which species, nor does it much matter, since any would do as well, or rather ill, in place of Eider-down.—C. C. Babington.

Maculate Plants.—Some time ago my attention was called to the fact (of which I have seen no record) that some maculate plants became nearly or quite non-maculate after flowering. I first observed it in a species of *Medicago* (allied to *M. maculata*), which I had growing in my garden. After the flowers were fertilised the purple spot disappeared and the leaf became of one uniform tint. I observed the same in *Lamium maculatum;* the leaves became (as regards colour) like those of *L. lævigatum*. I suspect the same takes place in *Arum maculatum*, but I have not as yet had the chance of observing it closely; indeed, I may remark that in Scotland we rarely find mature plants of *Arum* with any spots on the leaves.—A. Craig Christie.

A new Casual.—A curious instance of the facility with which plants are now imported is the occurrence of a little annual Composite plant on the sea-coast of N. Wales, near the Aber station of the Chester and Holyhead Railway. A few specimens only were found by Mr. J. F. C. Williams, of Bangor, who did not, however, make any special search for more. The plant is a species of the Californian genus *Bæria*, probably *B. platycarpha*, A. Gray, and the explanation of its occurrence is found in the fact of a cargo of Californian wheat having been landed near the spot two or three years ago. This little annual would thus appear to have produced ripe seed in its new locality; hence its occurrence is worth a passing note.—Henry Trimen.

Ranunculus tripartitus, *DC*.—Some specimens recently received from Mr. R. V. Tellam, collected in deep pools at Roche, near St. Austell, Cornwall, seem to be referable to this species, though the petals are smaller and more rounded than is usually the case. They possess well-marked submersed leaves, and thus differ from *R. intermedius*, Knaf, to which the name *R. tripartitus* has usually been applied in England. Submersed leaves have also been seen on examples of a plant frequent in the New Forest district, which in its usual state, though considered by Mr. Hiern to be *intermedius*, makes some approach to *Lenormandi;* in this it is common to find the stem almost bare of leaves below, those organs being very caducous. It is probable that

true *R. tripartitus* will be found not unfrequent in the western counties, Mr. Cunnack has collected it near the Lizard. Search should also be made in that part of England for *R. ololeucos*, which differs in having the petals wholly white, and for *R. tripartitus*, var. *submersus*, a curious form quite without floating leaves.—Henry Trimen.

Extracts and Abstracts.

GEOGRAPHICAL STATISTICS OF THE EXTRA-BRITISH EUROPEAN FLORA.

By Thomas Comber.

(*Concluded from* p. 185.)

Large genera, on the contrary, have a higher degree of dispersion than small, although the difference between them is not so great as in British plants. Ranking those genera as "large" whose total number of known species exceeds 100, we have this comparison:—

Species.			Average.
1933	belonging to 65 large genera	. . .	2·68
4684	,, smaller ,,	. . .	2·61

Variability, or a tendency to produce varieties differing from the typical form, was found amongst British plants to be accompanied by an increased specific range. In the following comparison, which shows that such is also the case amongst Continental plants, those species have been ranked as variable that comprise forms sufficiently divergent from the type to be considered by some authors distinct species:—

Species.		Average.
1528	variable	3·69
5089	not variable	2·31

IX. Alpine plants.—Having now checked, so far as the materials to which I have had access have enabled me to do so, as many as possible of the former observations respecting the dispersion of British plants, by similar inquiries concerning the Continental flora, I have in conclusion to draw your attention to a subject which did not present itself to our notice when we were considering the British lists, namely, Alpine plants. Accepting Mr. Darwin's theory of a glacial migration as accounting satisfactorily for the presence of what I have termed Arctic-alpine plants in the extreme North and on the high mountains of Southern Europe, and their absence from the intermediate low grounds, the question arises, Why are not Alpine plants also found in the Arctic regions? Does it arise from their more recent origin as species: from their not having come into existence until after the departure northward of the Arctic-alpine species? The relative specific areas of the two may afford some evidence on the point. They average as follows:—

Species.		Average.
101	Arctic-alpine	9·39
404	Alpine	1·77

The comparison indicates that very few of our present Alpine species can have been in existence *before* the glacial age, for if they had then flourished, along with the Arctic-alpine species in the circumpolar area, we should find them now equally widely spread over the mountains of the temperate zone. Of 101 Arctic-alpine species 72 (or 71 per cent.) are found in all the Northern Continents, and 44 (or 43 per cent.) are common to the mountains of the Old and New Worlds; but of Alpine plants none are "universal," and only 2 (or $\frac{1}{5}$ per cent.) are found on both sides the Atlantic. With the exception of these two species, and possibly some few others which extend from the Alps to the Himalayas, or even to the Baikal mountains, Alpine species are of so limited a range that we cannot conceive their existence before the glacial age. Again, if they came into existence *during* that period, whilst the Arctic-alpine species occupied the plains of S. Europe, they would have had their opportunities for spreading equal to those of the Southern plants which now occupy the same position; but if they are of later origin, and only became the companions of the Arctic-alpine species after their retreat up the mountains, we should expect to find them less widely dispersed, for they are as much isolated on the mountains as they would be on islands, the hot plains being as great a hindrance to their spread in the one case as the sea is in the other. The comparison between plants now found only in Southern latitudes, but confined to different elevations, is as follows:—

Species.		Average.
404	Alpine, above cereal line	1·77
4752	Southern, below cereal line	2·29

This betokens that at any rate a great many of the Alpine species have originated since the isolation of the mountain ranges. Some, however, are common to the Alps and Pyrenees, or to the Alps and the mountains of E. Europe and Asia Minor, or even occur on all. Respecting these wider rangers three hypotheses suggest themselves:— 1. They may have originated while the climate of S. Europe was still sufficiently severe to admit of their ranging over the low country, mixing there with the older Arctic-alpine species which had come from the North. Returning warmth would drive them upwards on to the mountains, where they may have succeeded in establishing themselves, but have failed to accomplish the longer journey northwards. That some such extinctions would take place amongst the species migrating to the North is but natural, for they would be crowded together into a much smaller area, so that the struggle for existence would be more fierce. 2. They may have originally possessed a greater range of elevation than at present, resembling formerly what I have termed "temperate plants confined to S. latitudes." In connection with this we must bear in mind what Dr. A. Gray has pointed out, that a few plants of Alpine elevation in Europe are only subalpine, or even inhabit the low country in America. 3. They may have originated since the isolation of the Alpine regions, but have been carried from one to the other by winds or birds.

Which of these three explanations is the correct one I will not

attempt to decide, for statistics appear to afford no evidence on the point; unless, indeed, the following comparison between Alpine plants with and those without a pappus or similar organ has some bearing upon the third hypothesis, on the supposition that pappose fruit is the more readily dispersed by wind. It shows that amongst Alpine plants the average of species bearing such fruit is 8 per cent., whilst amongst other plants it is 19 per cent., below the average of species with fruit not pappose.

Alpine Species.	Average.
60 with pappus, &c.	1·65
344 without „	1·79

COHN'S "BEITRAGE ZUR BIOLOGIE DER PFLANZEN."

We shall notice seriatim the rather long overdue contents of the two last parts (vol. ii., parts 1 and 2) of this publication.

Part 1 commences with *Zelle und Zellkerne. Bemerkungen zu Strasburger's Schrift* "*Ueber Zellbildung und Zelltheilung*," in which Dr. Leopold Auerbach criticises some portions of Prof. Strasburger's work recently noted in these pages. He holds that the nucleus is not an aggregation of protoplasm, but a sort of drop filled with fluid, which afterwards becomes surrounded by a membrane formed on the innermost layer of the surrounding protoplasm; the nucleolus is supposed to be formed by aggregations of nucleolar substance inside the nucleus. He thinks that Strasburger, in the case of *Phaseolus*, has mistaken nucleolus for nucleus, and that what is in reality a cell is mistaken for the nucleus; while in *Ephedra* the mistake has been committed of viewing as a nucleus a circuit of protoplasm with a nucleus originating in its interior. The subject is one of extreme difficulty, but when the author tries to show that Strasburger's figures are inconsistent, we must say that we cannot agree with him. After all, is it necessary that the nucleus of both animal and vegetable cells should have the same minute structure?*

Anatomie der vegetativen Organe von Dionæa muscipula, Ell. Von Dr. A. Fraustadt. In this memoir will be found an exhaustive account worked out at the same time that M. C. De Candolle was publishing his paper on the same subject. The author observes that the incapacity of the leaves for long-continued digestion is compensated by the rapid growth of young leaves to take the place of the old ones. He suggests that creatures like Woodlice and Myriapods may be most easily preyed upon by *Dionæa*.† He finds plenty of starch in the epidermal cells of those leaves which have not absorbed nitrogenous substances, but this is not the case where there has been absorption of nutriment.‡ Experiments were made

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* Those who may wish to go further into the question will find a *resumé* by Mr. John Priestley of Auerbach's views, with reproduction of figures, in Quart. Journ. Micros. Science, 1876, p. 131.

† This has long been our opinion; it seems to us that an immeasurably quicker movement of the closing lobes would be requisite for the capture of ordinary winged insects.

‡ With this may be compared the disappearance of the starch from the cortical cells in the neighbourhood of the suckers of *Cuscuta*.

with albumen coloured with aniline-red, and "aggregation" was observed in the cells of the glands, an especially strongly-coloured mass being considered as the nucleus, and some of the peripheral vessels of the large median fibro-vascular bundle of the leaf-stalk assumed a red tinge.* Another experiment, in which saffron was used as the colour-vehicle, was less successful, as none of the elements of the fibro-vascular bundles were tinted. A fact relating to stomata which we do not remember to have seen before, is that these openings are present *on both sides* of the marginal spikes, a most remarkable thing when it is remembered that there is not a stomate on the upper surface, but which has a simple explanation, viz., that *both sides of the spikes are always exposed to the air.* It would take us too far to go into the contents of this paper in detail; it is sufficient to say that it is a most useful accompaniment of, and supplement to, the work of Messrs. Darwin and De Candolle.†

The next paper is a short one by Dr. J. Schroeter (*Ueber die Entwickelung und die Systematische Stellung von Tulostoma, Pers.*) in which, after an account of the various phases of fruit-development, during the course of which no sexual arrangement was brought to light, it is proposed to erect *Tulostoma* into a special order (*Tulostomaceæ*); to this may perhaps be added, as a second genus, *Pilacre* Tul.

Beitrag zur Kenntniss der Chytridiaceen, von Dr. Leon Nowakowski, contains descriptions of the following new forms. *Chytridium destruens*, parasitic on *Chætonema irregulare* (n. gen. et sp.). *Ch. gregarium*, found in tolerable quantity in the egg of a Rotifer, with which is compared the organism taken by Mr. H. J. Carter as sperm-cells in the ovisac of *Naias albida*. *Ch. macrosporum*, found singly in the egg probably of a Rotifer. *Ch. coleochætes*, growing in the oogonia of *Coleochæte pulvinata*; the zoospores of this species enter at the mouth of the oogonial tube like the plant's own antherozoids, and the parasite becomes funnel-shaped, with the funnel projecting into the tube and afterwards from beyond its mouth; sometimes two or three individuals may be seen in one oogonium, and once four were found, but they had not attained maturity: the process of cortication is arrested in the attacked oogonia. *Ch. microsporum*, occurring on *Mastigothrix æruginosa*. *Ch. Epithemiæ*. *Ch. Mastigotrichis*, remarkable for having a zoosporangium from which branches are given off,

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* M. Micheli (Arch. des Sc. de la Bib. Univ., July, 1876) properly objects to the observation of Mr. J. W. Clark (Journ. of Botany, 1875, p. 268) who, by means of the spectroscope, found in various parts of the subjects of experiment traces of lithium introduced (as citrate of lithium) through the leaves of *Drosera* and *Pinguicula*, that the absorption of the mineral salt is not an absolute test of the absorption of albuminoid matter. The above-mentioned experiments with coloured albumen show that Mr. Clark's method is not at fault.

† The principal point on which the present author differs from M. De Candolle relates to the structure of the basal part ("articulation") of the sensitive bristles, in which Dr. Fraustadt did not see the two large "cells of the articulation" discovered by M. De Candolle. The latter gentleman assured us that, in order to find these, the section must go through the centre of the articulation. Our own preparation shows (on one side only) what may perhaps be a small portion of one of the cells in question.

which act as haustoria if they happen to meet a Mastigothrix-thread. *Obelidium mucronatum* (gen. et sp. nov.), found in the empty case of a fly-larva, has a dichotomous mycelium from which the zoosporangium is divided off; the zoospores (generally eciliate) germinate on the surface of the larva-skin by sending out some mycelial threads, while they themselves form the foundation of the new zoosporangium. *Cladochytrium tenue* (gen et sp. nov.) grows in the tissues of *Acorus Calamus* and *Iris pseudacorus*; its unicellular mycelium consists of fine branched threads, which, entering the cells of the host, form there spindle-shaped enlargements; these spindles often become divided by means of a transverse partition into two equal halves, in one of which all the protoplasm collects; it is this plasma-filled half which becomes the zoosporangium, while the empty part remains as a small bladder-like appendage. Sometimes however, the future zoosporangium does not divide, and sometimes each of its halves becomes a zoosporangium; occasionally, too, a new zoosporangium is developed inside an empty one, or a swelling of plasma preparatory to formation of a zoosporangium buds by throwing out a mycelial thread which breaks through the zoosporangial wall, and then sends forth branches. *Ch. elegans*, found only in *Chætophora*-slime, is supposed to be a parasite of some plant to which the *Chætophora* is attached. This species differs from the last by its possession of a lid to the zoosporangium, by the uplifting of which the zoospores escape. The author has also ascertained that the resting-spore of *Rhizidium mycophilum* produces a zoosporangium as an immediate consequence of germination.

Bemerkungen über Organisation einiger Schwarmzellen. Von Dr. Ferd. Cohn. In this paper Dr. Cohn studies the structure of some *Volvocineæ*, especially *Gonium tetras*, the species found by Alex. Braun, and recently observed by Prof. Warming, and the structure of which is very similar to *G. pectorale*. Each cell has two contractile vacuoles immediately followed by an excentric hollow space; the green protoplasm is collected principally at the base, and in this basal plasma the starch-nucleus is embedded. Division takes place first by means of a septum coinciding with the longitudinal axis of the cell and separating the starch-nucleus into two equal portions, and then each of the new halves is divided by a septum at right-angles to the former one. Moreover all stages of this dividing process can be seen in a colony at the same time. The growth was observed in the latter half of January, and the end of February saw the passage into the resting state, the cells assuming a globular form and becoming surrounded by a double membrane. Carmine stains the inside part of the starch-nucleus a beautiful red, proving it to consist of protoplasm, but the outside wall remains colourless. This reaction supports the view that these so-called "starch-nuclei" are in reality composed of protoplasm surrounded by a shell of starch which has been formed from the chlorophyll of the cell. Similar starch-nuclei occur in *Eudorina*, *Pandorina*, *Volvox*, *Palmellaceæ* and *Characium*; and comparable with these are the accumulations of chlorophyll and starch surrounding the nucleus of the mother-cells of the spores of *Isoëtes* and *Anthoceros*. In the cells of *Cladophora*, *Pediastrum*, *Hydrodictyon*, and *Ulothrix* several starch-nuclei are found; these, though essentially similar to the before-mentioned, differ from them by the fact that they dissolve

before division of the cell-contents. In *Stephanosphæra* and *Chlamydococcus* the nucleus with its nucleolus is developed only in the resting state, but the capacity shown by the hollow space to become coloured by carmine renders it possible that this may answer to a nucleus, here irregularly contoured with regard to the surrounding protoplasm.

PART 2. *Ueber die biologischen Verhältnisse des Thallus einiger Krustenflechten*, von Dr. A. B. Frank, is the record of a series of studies of the early history of the Lichen-thallus and its associated gonidia. The thallus of *Arthronia vulgaris* appears, while still under the bark-surface or "hypophloödical," in the form of greenish spots easily distinguishable from the grey or grey-green bark. The cork regions occupied by the growing hypha are thicker than those that are free from it.* Moreover at this time careful examination shows no trace of gonidia, and in the case of the Ash the author can assert with confidence that the *Chroolepus*-gonidia characteristic of *Arthronia vulgaris are not found free on the bark.* Afterwards the greenish spots become variegated with white; this is a certain sign of the arrival of gonidia, which are found only in the white spaces. It would thus appear that the *Chroolepus* finds a suitable nidus only in those portions of cork which have been penetrated by the hypha; arrived here, it enters the layer of cortical parenchyma by a process which is compared with the penetration of *Chlorochytrium* into the tissues of its *Lemna*-host, and ultimately reaches the Lichen-thallus, which latter after some time grows through its cortical investment, and becomes "epiphloödical." That the occurrence of gonidia in association with the hypha is essentially dependent on an ordinary law of distribution is shown by studying *Arthronia epipasta*, which is entirely deprived of gonidia, and on the bark of the host of which (but never in connection with the hypha) are found specimens of *Pleurococcus*. The thallus of *Arthropyrenia Cerasi* consists of very fine unjointed colourless threads which show a tendency to collect together in their cork-cells in a net-like manner, in association with the larger- and brown- jointed mycelial system of a (probably) Pyrenomycetous Fungus, which lies over the Lichen. Intermingled with these latter occur single or grouped *Pleurococcus* cells, taken by Tulasne to be the gonidia of *Arthropyrenia*, with which, according to the present author, they have nothing to do, the Lichen being entirely devoid of gonidia. *Lecanora pallida* has an at first hypophloödical and homogeneous thallus, which becoming stronger breaks through the covering periderm and differentiates into the three layers. In unexposed parts of the bark longer hypophloödical duration of the thallus is favoured, and already in this condition the gonidial layer can be seen beneath the periderm, which has a thickness of 2-4 layers of cells. The latter is after a time broken through, and the thallus now differentiates into its thick-weaved cortical portion above, while below the hypothalline layer is formed by the penetration of several hypha-threads, lying in the lower part of the gonidial layer, into the immediately underlying periderm. As to the way in which the gonidia and hypha-threads arrive in the bark, the author has ascertained that their introduction takes place through fine

* With this may be compared Solms' observation on increase of the tissues investing growing examples of *Brugmansia Zippelii*, Bot. Zeitung, 1876, p. 464.

fissures or gaps in the surface caused by injury to one or several of the superficial cells. In the case of *Variolaria communis* many Palmellaceous forms entirely similar to the gonidia (as well as other foreign bodies) lie within the thallus, but they are incapable of acting as gonidia and soon die in this position. This fact, which certainly looks rather like a support for anti-Schwendenerians, is ingeniously explained in an opposite spirit by calling in another fact viz., that on the border of the gonidial layer occur very small cells endowed with capacity for multiplication; the two facts taken together would seem to show that the gonidia have been gradually adapted to their habitat, this adaptation having been rendered possible through long-continued multiplication by means of soredia.

In *Beitrag zur Kenntniss der Chytridiaceen*, Dr. Nowakowski gives an account of the life-history of the *Euglena*-parasite, studied already by Baill, A. Braun and Schenk, to which he gives the name *Polyphagus Euglenæ*. The organism appears in the form of globular colourless cells between resting *Euglena* individuals, from the surface of each of which are soon given out four cruciate or several radiate immeasurably fine threads, which elongate until they come in contact with a resting *Euglena*, whose surface they penetrate and, entering into the green protoplasm, live at the expense of the latter. A thread which has chanced to enter a *Euglena* becomes larger than its fellow and club-shaped, and in consequence of the nutriment supplied by the host, the parasite continues growing (one sign of growth being the formation of secondary branches on the attached threads), and the nucleus with which it was originally provided entirely disappears. After a time the organism consists of a system of unjointed branched threads with exceedingly fine ultimate ramifications. Sometimes the globular cells are attached immediately to the host, and at other times several parasites take possession of the same host which, whether attacked either by one or by several parasites, loses its green colour and becomes first greenish-yellow and then brownish. Reproduction by zoospores was observed at the end of April. The zoosporangia are formed by protoplasmic outgrowths from the side of the thickened body of the parasite (prosporangium), and are at first not covered by a limiting membrane; they are of oval or cylindrical figure, and when fully formed become divided off from the prosporangium by means of a transverse partition. The zoospores are colourless with a large nucleus, several vacuoles and a long posterior flagellum; usually they are in considerable quantity in each sporangium, but in one case as few as two were found. After swimming about for an hour or so they come to rest, assume a globular form, and send out *Acineta*-like branches of which mention was made in commencing; they are now, in fact, ready to commence depredations on any resting *Euglena* they may happen to come in contact with. The author has also observed sexual reproduction, which takes place by means of smooth-membraned resting-spores resulting from copulation between a female element consisting of a large usually globular or irregularly outlined plasmatic body, and a generally smaller clavate, elongated or spindle-shaped male element; it is often very difficult, however, to determine the sex before copulation, which consists in the blending of the entire contents of the male element with those of the female wholly extruded in the form of an

oval gonosphere. Since the whole contents of two, sometimes almost equal masses of protoplasm are utilised in effecting this union, the resulting spore must be considered as a zygospore ; but it may also be regarded as an oospore, since the two elements are not entirely similar. Besides the smooth-membraned there are spiny resting-spores formed without extrusion of a gonosphere ; these were not seen to germinate. As for the first-mentioned resting-spores, they immediately develope zoosporangia after remaining dormant for about a month. The author shows that the genus under examination is distinguished from *Rhizidium* (to which A. Braun and Schenk referred the *Euglena*-parasite) by the fact that the latter is two-celled, one of the cells being branched and the other acting as zoosporangium ; he also indicates the similarity, based on the presence of a prosporangium, between *Polyphagus* and Sorokin's genera *Zygochytrium* and *Tetrachytrium*.

The next paper (*Die Keimung der Sporen und die Entstehung der Fruchtkörper bei den Nidularieen*, von Dr. Eduard Eidam) is occupied with the development of *Cyathus* and *Crucibulum* from the spore, filling up the hiatus between previous inquiries on the formation of the fruit, and Hesse's incomplete study of spore-germination recently published in Pringsheim's "Jahrbucher" (vol. x., p. 199). By a careful culture-method the spores of *Cyathus striatus* were observed producing a branched mycelium which, where the conditions were not very favourable, showed a tendency to break up into biscuit-shaped bodies (Theilzellen) ; these are regarded as a sort of resting state of the mycelium, ready to germinate when the conditions again become favourable. In addition, the mycelium produces small lateral outgrowths (Schnallenzellen) which, like the ordinary mycelial branches, in the course of development often become united one to another. Formation of fruit was not observed in the culture-fluid, but all stages of it were found in a state of nature. In this connection it is sufficient to say that all the threads concerned in the formation of fruit *are essentially similar in nature*, nothing like a *carpogonium* being seen. The mycelium of *Crucibulum vulgare* was found to be much like that of *Cyathus*, except that no Theilzellen were formed, and development of fruit (not seen in culture-fluid) was essentially similar. The budding of spores while still inside the sporangium, and penetration of the wall of the latter by the emitted filaments, was observed in this species.*

In a fourth memoir on the germ-theory (*Beiträge zur Biologie der Bacillen*), Prof. Cohn tries to answer the question, Why is it that exposure to a temperature of 100° C is not more than sufficient to destroy bacterioid life, since all other organisms succumb on exposure

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* It will be observed that the views of this author since he emitted the nothing less than sensational idea of the *sexuality of the spore* of *Agaricus coprophilus* (Bot. Zeit., 1875, p. 649), have undergone considerable modification, for he considers the fact of the germination of spermatia as sufficient evidence against their sexuality. As his memoir is, however, dated June of last year, he may possibly have since altered his opinion. With regard to the reproduction of *Gasteromycetes*, taking into account the most recent studies of development in this group viz., those of Sorokin on *Scleroderma*, of Schroeter on *Tulostoma*, and of the present author on *Cyathus* and *Crucibulum*, as well as those of older writers, there can scarcely be a doubt that here is no carpogonial reproduction.

to much lower temperatures? The experimental liquid consisted of an infusion of hay prepared after Roberts' method, and comparison was made of the organisms developed in both acid and neutral cooked and uncooked infusions. In the latter were found great quantities o *Bacterium Termo*, *Micrococcus*, *Ascococcus*, *Sarcina*-like masses, *Torul* rosary-chains, *Bacillus*, *Leptothrix*, and yeast-cells, the liquid becoming turbid and opaque, and strongly acid. After a time on the surface of the infusion occurred *Penicillium*, the mycelium of which penetrates the zooglea crust formed in this part. The organic product of 13 out of 24 experiments with infusions (both acid and neutral) heated to 100° C is the next object of inquiry. These cooked liquids show only slight turbidity, and if a portion of their superficial fluid is examined it is seen to be composed solely of vast numbers of *Bacillus subtilis*. The problem of the method by which this Schizophyte is enabled to retain its vitality is solved by the author's important discovery of spores. In spore-formation a row of strongly refractive small bodies appears in the before-homogeneous contents of the threads, and each of these small bodies increases to form an oblong or shortly cylindrical, highly refractive, dark-outlined spore. After the maturation of spores the individual threads are, as a rule, no longer distinguishable, though a linear disposition of spores can still be made out in the structureless masses formed by the agglomerated threads. With regard to the structure of the threads, a very high power (1650 diams.) shows that they are not undivided, but in reality segmented by transverse partitions. A further fact of great interest relating to the spores is that they are incapable of germination in the liquid in which they were produced.

The following is the summary of the principal results.

1. In cooked fluids *Bacterium Termo* does not develope, nor, at least so far as is known, does any other organism with exception of *Bacillus*.

2. The occurrence of *Bacillus* in the infusions is to be ascribed to the fact that it is the spores which are capable of resisting high temperatures. These spores gain access to the infusion by adhering to the hay-haulm, to which they have abundant opportunity of gaining access during the processes of making, and while it remains stacked.

3. The *Bacillus* multiplies freely by exposure to a temperature of 47°-50° C, while the rest of the *Schizophytes* present in the hay-solution are already rendered incapable of development by this temperature.

4. All multiplication and development of *Bacillus* ceases by exposure to a temperature between 50° and 55° C., but the spores under these circumstances retain their capacity for germination during at least seventeen hours after the death of the *Bacillus*.*

5. Single *Bacillus*-spores may retain their capacity for germination eve n after exposure to a temperature of 70°-80° C. during three or four days.

The subject is followed up by Dr. Koch (*Die Ætiologie der Mulzbrand-Krankheit, begrundet auf die Entwickelungs geschichte des Bacillus*

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* Compare with this the experiments of Pasteur, Hoffmann &c. (vide Sachs Physiologie Végétale, trans. Micheli, p. 72.)

Anthracis), who makes a successful study of the growth of *Bacillus Anthracis* concerned in splenic fever, the history of which is very similar to *B. subtilis*. He finds that in the bodies of certain animals the *Bacillus* multiplies with extraordinary rapidity, the cells elongating and becoming transverely partitioned. Mice, guinea-pigs and rabbits were inoculated with fresh *Bacillus*-containing fluid; but it was found that the inoculated animals behaved differently, the process being most successful with guinea-pigs, less so with rabbits, and still less with mice, while inoculation was fruitless in the cases of frogs, two hounds, a partridge and a sparrow. The author has also ascertained that, under proper conditions of temperature and access of air, the *Bacillus* flourishes in the blood of dead animals or in other fit nourishing fluids. After a culture in a nourishing fluid had been exposed for 15-20 hours to a temperature of 35-37° C., in the middle of the preparation only short cells were found; but as one passed towards the edge cells three to eight times the original length occurred, and at the edge itself the cells were ten times longer than those in the centre. In many of these elongated cells spores very similar to those of *B. subtilis* were developed; after formation of these the individual cells become invisible, as we have already seen to have been the case with *B. subtilis*. Culture-fluids in which were sown spores, but which contained no ordinary *Bacillus*, developed the latter plentifully, showing that what are taken for spores are not accidental aggregations of the cell-contents. All attempts to cultivate the spores in distilled and spring water failed. Experiments made to test the capacity of the spores to resist drying up showed that, if dried in thin layers, they proved unfit for germination in from twelve to thirty hours, but that thicker layers retained vitality for two or three weeks, and by slow drying for four or five weeks. With regard to temperature, 35° C. is most favourable, below 18° C. the spores are only exceptionally formed, and below 12° C. growth is completely arrested; on the other hand, development is feeble at 45° C., and it appears to cease at 50° C. The sources of splenic fever would seem to be infected carcases buried not deeply enough, affected animals lying in fields, stalls and flaying-places, and waste products of sick animals in moist ground. The preventive measures recommended are deep burial in dry ground, disinfection and separation of healthy animals. Two additional pieces of information are worth giving viz., that in the sea district of Mannsfeld, in Prussia, the yearly loss of sheep from splenic fever is represented by 180,000 marks, and that in the government of Novgorod alone, in the period 1867-70, no less than 56,000 horses, cows and sheep, and 528 men, fell victims to this exacting pestilence. S. M.

The Respiration of Roots.

Recherches sur la respiration des racines. Par MM. P. P. Dehérain et J. Vesque. (Ann. des Sciences Nat. vi série, tome iii, p. 327.)

The instrument used in these experiments consists of an inverted test-tube, pierced with three holes above and one near the bottom. The plants made use of were Ivy and *Veronica speciosa*; they were planted in pumice-stone inside the test-tube, and a hole was made for the stem in a caoutchouc plug inserted in the middle hole. One of the

side holes was furnished with a stop-cock, and the other with a mercurial manometer and a thermometer: the lower hole was also provided with a stop-cock, and was in communication with a water cistern; by means of the two stop-cocks the air could be either expelled from, or introduced into the test-tube at pleasure.

If the above-sketched apparatus be left alone for some days, the manometer indicates diminution of pressure in the interior of the test-tube not referable to diminution of temperature or change in barometric pressure. The first result worth recording stands thus:—

	cub. cms.
Total amount of gas collected . .	135·2
Carbonic Acid	2·0
Oxygen	22·6
Nitrogen	110·6

Which shows that 5·74 cub. cms. of Oxygen have been absorbed, and have only partially been replaced by Carbonic Acid. The amount of Nitrogen has also increased, whence arises the question (unsettled in this paper), is this increase of Nitrogen only apparent, or is there really diffusion of this gas through the tissues of the plant?

Further experiments with a modified apparatus gave—

		cub. cms.		cub. cms.
Original amount of	Oxygen	. 25·78		
Final		. 14·00	minus difference	11·78
Original ,,	Nitrogen	. 97·20		
Final ,,	,,	. 97·4	plus difference	·20
,,	Carbonic Acid	. 6·30	plus difference	6·30

In another experiment the gas lost 5·18 cub. cms. of Oxygen, and gained 1·79 cub. cms. of Carbonic Acid.

Action of roots on an atmosphere of pure Oxygen.—A *Veronica* was kept in the apparatus during eight days. The manometer indicated great diminution of pressure, which became gradually less marked, then stationary and finally slightly reversed. The analysis stood thus:—

	cub. cms.
Amount of original Oxygen	22·1
,, final Carbonic Acid . . .	2·1
,, ,, Nitrogen	9·1
,, ,, Oxygen	10·9

Showing as before, that (if there is no fault in the apparatus) Nitrogen has been exhaled as well as Carbonic Acid.

Action of roots on an atmosphere deprived of Oxygen.—In these instances Ivy was used. The first trial was with an atmosphere rich in Carbonic Acid ($\frac{1}{3}$ vol. CO_2); after some days, as the plant did not suffer, an atmosphere entirely composed of Carbonic acid was substituted, and under these circumstances it died. Another Ivy plant was exposed to an atmosphere of pure Nitrogen, and the result obtained was as follows:—

	cub. cms.
Amount of original Nitrogen . . .	21·1
,, final Oxygen and Carbonic Acid .	1·5
,, ,, Nitrogen	19·6

But the authors think that perhaps this result is due to faulty apparatus. Another experiment under the same conditions as the last, but in which *Veronica* was substituted for Ivy, gave—

	cub. cms.
Amount of original Nitrogen	22·1
,, final Carbonic Acid	1·6
,, ,, Oxygen	0·1
,, ,, Nitrogen	20·4

And another (still with *Veronica*) showed—

	cub. cms.
Amount of original Nitrogen . . .	20·3
,, final Carbonic Acid . . .	0·8
,, ,, Oxygen	0 0
,, ,, Nitrogen	20·3

The results obtained are strongly confirmatory of De Saussure's experiments on respiration. It is to be hoped that the authors will continue their work in this direction. S. M.

Balbiania investiens.

Le Balbiania investiens ; étude organogénique et physiologique. Par M. S. Sirodot. (Ann. des Sciences Nat. vi série, tome iii, p. 146.)

This paper is devoted to the life-history of the red Alga first figured by Hassel as *Batrachospermum rubrum*, and afterwards referred to *Chantransia* by Lenormand, who discovered that it was an epiphyte living interlaced among the filaments of its *Batrachosperm*-host. The result of the author's labours is to reveal a most interesting case of alternation of generations, as well as a certain difference from *Chantransia* which, he considers, justifies the foundation of a new genus. Of the two generations one is sexual, the other asexual. The former (found from March to July) commences by means of a "sporule" set free from a unicellular sporuligenous branch. The sporule in germination throws out both an ascending and descending axis, from all the cells of which (as well as from the sporule itself) branches are given off; these branches either become interlaced with the ramifications of the host or else form part of the differentiated thallus, which consists of cylindrical articulated filaments bearing 1-celled side-branches (sporuligenous cells), trichogynial cells, and terminal cylindrical or reniform antheridia grouped few together round a central spherical sterile cell crowning the expanded end of the branches. A single antheridial corpuscle (pollinide) escapes from each antheridium and attaches itself to the trichogyne in the ordinary way, but the result of fecundation is not an ordinary *cystocarp*, but what the author call a *desmidocarp*. In the formation of this fruit the fertilised trichogynial cell divides transversely, each of the new cells growing and producing branches and during this process the trichogyne is pushed to one side: at last results a ramified system, each terminal cell of which bears an oospore.* From this oospore the asexual generation (flourishing from July to March) takes origin, in the form of a necklace-like growth of nucleated cells (the cells of the sexual

* MM. Thuret and Bornet have quite recently described as a cystocarp the fruit of *Chantransia corymbulosa*, which is essentially similar to the so-called desmidocarp of *Balbiania* (Notes Algologiques, t. 6).

generation have no nucleus) from one end only of the oospore adherent closely to the surface of the host. Such growth, if examined in the month of March, shows unicellular sporuligenous branches producing the sporules with the germination and history of which we have already dealt.

The genus is distinguished from *Chantransia* by the absence of a prothallus, which is due to the biaxial germination of the sporule; but the germination of the oospore is, as we have already seen, uniaxial and prothalline, and furnishes an intermediate condition.

S. M.

Botanical News.

Articles in Journals.—May.

American Naturalist.—W. J. Beal, "Variation in æstivation."

Silliman's American Journal.—J. H. Trumbull, "Notes on the history of *Helianthus tuberosus*, the so-called Jerusalem Artichoke."

Ann. des Sc. Nat. (ser. 6, vol. iv., pt. 1).—S. Arloing, "Anatomical researches on the cuttings of Cactaceæ."—N. Sorokine, "Note on the vegetable parasites on Anguillulæ."

Oesterr. Bot. Zeitschr.—J. Wiesbaur, "Two Violets new to Austria."—C. Haussknecht, "On *Carex nemorosa*, Rebent."—T. v. Heldreich, "On three species new to European Flora."—L. Simkovics, "Descriptiones Plant. novarum."—A. Kerner, "Distribution of Hungarian plants" (contd.).—L. Celakovsky, "Notes on Flora of Bohemia" (contd.).—S. Schulzer v. Muggenburg, "Mycological notes" (contd.).—W. Vass, "On plant-diffusion (*Rudbeckia laciniata*).—J. L. Holuby, "On the flora of the Neutra districts."—F. Antoine, "Botany of Vienna Exhibition."

Bot. Zeitung.—H. Hoffmann, "Experiments in cultivation" (contd).—J. Peyritsch, "On the ovular theory."—H. Bauke, "On the development of Ascomycetes."—G. Kraus, "Occurrence of Inulin out of *Compositæ*."

Flora.—G. Winter, "Lichenological notes" (tab. 4).—H. G. Holle, "Assimilation in *Strelitzia regina*" (contd.).—F. v. Thuemen, "Diagnoses of Thuemen's 'Mycologia universalis'" (contd.).—E. Godlewski, "Is the assimilation product of *Musaceæ* oil or starch?"—W. Nylander, "Addenda nova ad Lichenographiam europœam" (29 new species, 9 British).—M. Gardoger, "Rosæ novæ Galliam austro-orient. colentur."

Hedwigia.—P. Magnus, "Remarks on some *Uredineæ*."—Sauter, "Mycological notes."

Magyar Növénytanilapok.—M. Staub and M. Toth, "On what soils does the Chestnut grow in Hungary?"

Botaniska Notiser (May 18). — F. W. C. Areschoug, "On mechanical cell thickening in leaves."—S. O. Lindberg, "Disentanglement of the forms confounded under the name of *Sauteria alpina*."—N. Wulfsberg, "Mosses from the North Bögeskov, Norway."—K. A. T. Seth, "Phanerogamic Flora of Medelpad."—O.

Nordstedt, "On *Pinus abies*, var. *virgata*, and its occurrence in Sweden."

Journ. Linn. Soc. (no. 89, May 31st).—J. C. Jackson, "Note on a commercial cone termed Whangee, a species of *Phyllostachys*."—W. A. Leighton, "New British Lichens."—J. Buchanan, "On the rootstock of *Marattia fraxinea*" (tab. 1).—G. Dickie, "Notes on Algæ collected by I. B. Balfour at Rodriguez."—I. B. Balfour, "Aspects of phanerogamous vegetation of Rodriguez, with descriptions of new plants."—M. J. Berkeley, "Fungi collected during voyage of the *Challenger*."—T. Powell, "Nature and mode of use of the vegetable poisons employed by Samoan islanders."

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New Books.—"Hooker's Icones Plantarum," ser. 3, vol. iii, pt. 1, June 1st (tt. 1201—1225. Williams and Norgate).—A. Blytt, "Norges Flora," Supplement (Christiania).—S. Calderon, "Considerations on Vegetable Nutrition" (Madrid).—A. Fischer de Waldheim, "Aperçu systematique des Ustilaginées" (Paris).—"Flora Brasiliensis," fasc. 72.—*Paniceæ*, by J. C. Döll (tt. 38).

A fifth and concluding part of Baron von Mueller's "Notes on Papuan Plants" has reached us, containing the rest of the species gathered in 1876 by Messrs. D'Albertis and Goldie, and giving descriptions of several new plants of various families.

In the "Verhandlungen" of the Natural History Society of Heidelberg (n.s., i., pt. 5) is a memoir by E. Pfitzer, "Studien über Bau und Entwickelung epiphytischen Orchideen."

Prof. A. Gray in his "Botanical Contributions," dated May, 1877, gives a full description of *Canotia*, which he refers without doubt to *Rutaceæ*, and describes a new gamopetalous Loasacea from California (*Sympetaleia*), and *Lemmonia*, a new genus of Hydrophyllaceæ named after its discoverer, Mr. J. G. Lemmon.

The Transactions of the Norfolk and Norwich Naturalists' Society for 1876-7 (vol. ii., pt. 3) contains an account of the Fungi found on a large heap of sawdust near Brandon by Mr. C. B. Plowright, 82 in number, including the rare *Boletus sulphureus*, Fr., and a new *Sphæria* (*S helicoma*). There are also in the same number a memoir of Mr. Lilly Wigg, of Yarmouth, by Mr. H. G. Glasspoole, and a catalogue of the Diatomaceæ of Norfolk, by Mr. Kitton.

By the publication of a Supplement containing additions and corrections to the early parts of the work, Mr. A. Blytt has now completed the "Norges Flora." The first part of this flora of Norway, by Prof. M. N. Blytt, appeared in 1861, since which date, mainly by the researches of his son, the knowledge of the vegetation of the country has been much extended. The descriptions are in Norwegian, and the pagination extends to 1348, a very thick volume.

Dr. Braithwaite has issued his volume of specimens of the British *Sphagnaceæ*, a group to which he has for some years paid special attention, under the title of "Sphagnaceæ Britannicæ exsiccatæ." All the known forms are well represented by good specimens, the number being fifty-three. Only sixty-six copies of this work have been prepared, being a few only beyond the number subscribed for.

In the "Journal of Anatomy and Physiology" for January last is a

paper by Mr. C. J. F. Yule, on the physiology of the dehiscence of the fruit of *Momordica Elaterium*.

Messrs. Bohnensieg and Burck's "Repertorium annuum" of Botanical Literature for the year 1874 has recently appeared. It appears to have been compiled with the same accurate care as the previous volumes, and the list of publications, the contents of which are here digested and arranged, is considerably more extensive than formerly.

"Notes on Sutton Park" is an account of the Flowering Plants, Ferns, and Mosses of that beautiful tract of land near Birmingham. The author, Mr. J. E. Bagnall, enumerates close upon 500 species of Phanerogams and Ferns, and 120 species and varieties of Mosses in the Park, which has an area of about 3500 acres.

We are glad to see that the publication of the concluding parts of the new edition of Pritzel's "Thesaurus Literaturæ Botanicæ," so long interrupted since the death of its author, is immediately expected. This will consist of a complete classified systematic bibliography compiled by Prof. C. Jessen.

Messrs. Allen Harker, of 17, Southgate Street, Gloucester, and G. S. Boulger, of the Scientific Club, Savile Row, are engaged in the preparation of a descriptive and topographical flora of Gloucestershire. For this purpose the county has been divided by them into twelve hydrographical areas, and they propose to prefix a sketch of the physiography of the county, to work up the bibliography and herbaria, public and private, and to append short notes on points of morphological or physiological interest. The publication of the work may be undertaken by the Cotteswold Club. To arrive at as complete a knowledge of the county distribution of species as possible, the authors wish for lists or specimens with localities, especially from the north-east of the county. Communications may be made to either of the above addresses.

Among those who received honours on the Queen's birthday was Dr. (now Sir Joseph) Hooker, President of the Royal Society and Director of Kew Gardens, who was made a Knight Commander of the Order of the Star of India. This well-deserved honour appropriately connects Sir Joseph's name with that Empire in the development of the botany of which he has been so largely instrumental.

The death of Dr. Jundzill, Professor of Botany at the University of Wilna, occurred on April 4th, in the eighty-seventh year of his age.

A novel kind of prize was offered at the last flower-show of the Royal Botanic Society, one for the best collection of living wild flowers collected within an area of five miles of any parish church. Several collections were sent in and exhibited at the show, where they attracted considerable attention. The first prize was awarded to Mr. J. Green, for a collection from Thundridge, Herts, consisting of a large number of plants in a beautifully fresh state, and correctly labelled.

M. Gandoger, Arnes, Rhone, près Villefranche, is anxious to exchange with British botanists. He especially desires plants from Scotland and the Northern Isles, and the forms of the critical genera, *Rosa*, *Rubus*, *Salix*, *Mentha*, &c.

Original Articles.

BRYOPHYTAS ET CORMOPHYTAS COSTARICENSES anno 1875 lectas

enumerat. H. Polakowsky.

I. Bryophyta, *A. Br.*

A. *Thallodea*, A. Br.

Algæ, *Ag.*

(*auct.* Al. Braun.)

1. *Stigeoclonium* (Kg. Phyc. gener.), spec.—In fonte universitatis. San José. (No. 184 coll. plant. mearum in Herb. reg. berol.)

2. *Cladophora* (Kg. l.c.), spec. Cum multis Diatomaceis.—In fonte universitatis. San José. (No. 183 et 211.)

Lichenes, *Ach.*

(*auct.* W. Nylander.)

Collemaceæ.

3. *Leptogium bullatum* (Sw.), Nyl.—In truncis vetustis, silvarum primæv. Angostura. Novemb. (No. 456.)

4. *L. diaphanum* (Sw.), Nyl.—In silvis humidis primævis. Angostura. Novemb. (No. 476.)

5. *L. phyllocarpum* (Pers.), Mont.—Fl. Chil. viii., p. 226= *Collema phyllocarpum*, Pers.—In cacteis (*Cereus*, sp.) vetustis prope San José. Junio. (No. 113.)

6. Cœnogonium interponendum, *Nyl.*, nov. sp. Sat simile *C. interposito*, Nyl., Cœnog., p. 91, sed filamentis crassit. 0·017-20 millim. (articulis longit. 0·040-50 millim.), sporis fusiformibus 1-septatis (circiter longit. 0·008 millim. et crassit. 0·0025 millim.).—In truncis et arboribus vetustis silvarum primæv. Angostura. Novemb. (No. 496.)

Lecidineæ.

7. Cladonia corymbites, *Nyl.*, nov. sp. Subsimilis fere *Cladoniæ furcatæ*, var. *corymbosa*, aut foliolosæ (Del.), sed stenophylla, foliolis angustis ut in *Cl. endiviella*, qua distat podetiis soribus et sporis minoribus. In *Cl. corymbites* sporæ longit. 0·010-16 millim., crassit. circiter 0·0035 millim.—In declivibus arenosis. Angostura. Novemb. (No. 472.)

Parmeliaceæ.

8. *Parmelia latissima*, Feé.—Ad rupes (porphyrites). Angostura. Novemb. (No. 484 A, 494 et 497.)

9. P. costaricensis, *Nyl.*, nov. sp. Sat similis *P. lævigatæ* (Sw.), sed thallo passim minute isidiello, reactione medullæ hydrate Kalico

et hypochlorite calcico nulla, apotheciis pallidis, receptaculo inæquali, sporis parvulis (longit. 0·006-8 millim. crassit. 0·004-5 millim.). Spermogonia non visa.—Ad rupes. Angostura. Novemb. (No. 491.)

10. *Sticta rufa*, Del. Stict., p. 47 = *St. damæcornis*, Auct., var. *rufa*, Church. Bab. MSS.—In arboribus vetustis silvæ Carpinteræ. Tres Rios. Junio. (No. 106.)

11. *S. rufa*, forma *hypogymna*, Nyl.—Eodem loco c. forma norm. (No. 106 A.)

12. *Stictina quercizans* (Ach.), Nyl.—Ad rupes. Angostura. Novemb. (No. 484.)

Usneaceæ.

13. *Usnea ceratina*, Ach.—In arboribus vetustis siccis. Angostura et Naranjo. (No. 351 et 470.)

FUNGI, *L.*

(*auct.* EL. FRIES.)

14. *Polyporus decipiens*, Schwg., var. *detonsa*.—In arboribus vetustis. Angostura. Novemb. (No. 400.)

15. *P. sanguineus* (L.), Fr.—Syst. Mycol. i., 371.—In arboribus vetustis. Angostura. Novemb. (No. 457.)

16. *P. umbonatus*, Fr.—In truncis vetustis. Angostura. Novemb. (No. 358.)

17. *P. umbino-marginatus*, Fr.—In truncis vetustis. Carpintera, Tres Rios. Julio. (No. 187.)

18. *P. unguicularis*, Fr.—In arboribus vetustis. Cartago. Angostura. (No. 186.)

19. *Calocera* (Fr. Syst. Mycol. i., 485), spec. (determ. P. Magnus). Fungillus maxime insignis cujus genus mihi haud clarum. (E. Fr. in litt.) Fungus summopere insignis, novus, sed ex exemplaribus non determinandus. (E. Fr. in Herb. reg. ber.)—In trabibus vetustis puentis Rio Reventazon. Angostura. Novemb. (No. 469.)

Indeterminabiles.

20. *Æcidium* (?).—In gramineis. Cartago. (No. 275.)

21. *Pyrenomyceta.* Insignis sed haud fructificans.—In foliis Burserac. San José. Decemb. (No. 552.)

22. *Xylaria*, Pers., videtur, sed sterilis, haud determinanda.—In arboribus vetustis. Alajuela, Dèsengaño. (No. 123 et 123 A.)

B. *Thallophyllodea*, A. Br.

HEPATICÆ, *Juss.*

(*auct.* C. M. GOTTSCHE.)

Jungermannieæ.

23. *Plagiochila Oerstediana*, Hmp. et Ldbg.—Linnæa 24, p. 301.—In arboribus. Alajuela. Junio. (No. 127 A.)

24. *Jungermannia erythrorhiza*, L. L.—Syn. Hepat., p. 127. Annal. d. Sc. Natur., 5ᵉ sér., tom. 1. Hook. Antarct. Voy. ii., 2, p. 149.—In locis arenosis. Angostura et Zapote. Novemb. (No. 468.)

Platyphyllæ.

25. RADULA COSTARICENSIS, *Gottsche*, nov. sp. ♀. Perianthiis

infundibuliformibus ore labiis undulatis. Simillima *Radulæ patenti* α., sed perianthiis infundibuliformibus labiisque undulatis plane diversa. —In silvis humidis. Alajuela. Junio. (No. 120 A.)

26. *R. pallens*, N. ab Esb., var. β. *minor*.—Syn. Hepatic., p. 256. Sterilis.—In silvis humidis. Alajuela. Junio. (No. 120 C.)

27. *Madotheca costaricensis*, Gottsche MSS., nov. sp. ♂.—In silvis ad arboles. Alajuela. Junio. (No. 120 B.)

Jubuleæ.

28. *Bryopteris filicina*, N. ab Esb.—Syn. Hepatic., p. 284. Sterilis. —Ad fossas. San José. Julio. (No. 297.)

29. *B. filicina*, N. ab Esb., α. *Hookeriana*.—Syn. Hepat., p. 284.— In arboribus. Alajuela. Junio. (No. 127.)

30. *B. flaccida*, Lindbg. et Hmp.—Hepat. Oerst. in Linnæa 24, p. 640.—In truncis silvarum primæv. Carpinteræ. Junio. (No. 109.)

31. *Lejeunia piriflora*, Gottsche MSS., nov. sp.—In locis humidis silvarum. Alajuela. Junio. (No. 120.)

32. *Frullania gibbosa*, N. ab Esb.—Syn. Hepat., p. 411.—In silvis primævis ad terram. Angostura. Novemb. (No. 454.)

33. *F. squarrosa*, N. ab Esb.—Syn. Hepat., p. 416.—In silvis primævis. Angostura. Novemb. (No. 467 A.)

34. *F. cylindrica*, Gottsche, var. *minor*.—Syn. Hepat., p. 458.— In locis humidis silvarum. Augostura. Novemb. (No. 467.)

Metzgerieæ.

35. *Metzgeria furcata*, N. ab Esb.—Syn. Hepat., p. 502.—In locis humidis silvarum. Alajuela. Junio. (No. 120 D.)

Marchantieæ.

36. *Marchantia chenopoda*, L.—Syn. Hepat., p. 535. ♀.—Ad fossas et in silvis primævis. San José et Augostura. Julio et Novemb. (No. 298 et 452.)

37. *Marchantia*, spec. sterilis.—Ad fossas. Savannah prope San José. Junio. (No. 112.)

BRYACEÆ, *Endl.*

(*auct.* C. MUELLER *halensis.*)

Fissidenteæ.

38. *Fissidens reclinatulus*, C. Muell. MSS.,* nov. sp.—In truncis vetustis. Savannah de San José. Decemb. (No. 499.)

39. *F. chrysopoma*, C. Muell. MSS., nov. sp.—Ad margines fossarum. San José. Augusto. (No. 357.)

Leucobryaceæ.

40. *Ochrobryum Polakowskyi*, C. Muell. MSS., nov. sp.—In pratis udis. Naranjo, Prov. de Cartago. Novemb. (No. 352.)

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* It is the intention of Mr. C. Mueller to describe in the "Linnæa" the new species here indicated as soon as his other engagements permit.—[*Ed. Journ. Bot.*]

Funarioideæ.

41. *Funaria calvescens*, Schwaegr. (Suppl. L. P. ii., p. 77), C. Muell. Syn. i., 107 = *F. hygrometrica*, γ. *calvescens*, Bryol. Europ. l.c., p. 9. —Prope San José, in locis arenosis et ad margines fossarum. Junio et Augusto. (No. 110 et 299.)

42. *Physcomitrium macrocyathum*, C. Muell. MSS., nov. sp.—In pratis udis. San José. Julio. (No. 292.)

Polytrichaceæ.

43. *Polytrichum* (*Catharinella*) *Polakowskyi*, C. Muell. MSS., nov. sp.—In declivibus prope Angostura. Novemb. (No. 451 A.)

44. *P. rhacomitrium*, C. Muell. MSS., nov. sp.—Ad fossas. Savannah de San José. Augusto. (No. 249.)

Bryaceæ.

45. *Bryum argenteum*, L. (C. Muell. Syn. i., 314,) var. *costaricense*, C. Muell. MSS.—Ad muros (Cathedrale de San José) et in truncis vetustis prope Angostura. Julio et Novemb. (No. 185, 185 B, et 483 B.)

46. *B.* (*Erythrocarpidium*) *juniperifolium*, C. Muell. MSS., nov. sp.—Ad margines fossarum. San José. Augusto. (No. 356 A.)

47. *B.* (subsect. *Doliolidium*) *viviparum*, C. Muell. MSS., nov. sp. —In truncis vetustis. Angostura. Novemb. (No. 483 et 487.)

48. *B. leucothrix*, C. Muell. MSS., nov. sp.—Cum priore. (No. 483 et 487 A.)

49. *B. clavatulum*, C. Muell. MSS., nov. sp.—In truncis vetustis. Silvæ primæv. Desangaño. Julio. (No. 118.)

50. *B.* (sect. vi. *Dicranobryum*, C. Muell. Syn. i., 309) *Polakowskyi*, C. Muell. MSS., nov. sp.—Ad muros (Cathedrale de San José) et in pratis udis (Savannah). Junio et Decemb. (No. 185 A et 439.)

Dicranaceæ.

51. *Dicranum* (subs. *Campylopus*, C. Muell. Syn. i., 383) *spirothecium*, C. Muell. MSS., nov. sp.—In truncis vetustis prope Desengaño. Julio. (No. 126.)

Leptotrichaceæ.

52. *Angstræmia* (subs. *Dicranella*, C. Muell. Syn. i., 430) *pseudodebilis*, C. Muell. MSS., nov. sp.—In declivibus arenosis. Angostura. Novemb. (No. 455).

53. *Leptotrichum tenuisetum*, C. Muell. MSS., nov. sp.—In truncis vetustis. Desengaño. Julio. (No. 125 A et 129.)

Bartramioideæ.

54. *Bartramia* (*Philonotula*) *costaricensis*, C. Muell. MSS., nov. sp. —Ad margines fossarum. San José. Augusto. (No. 356 B.)

55. *B.* (*Philonotula*) *garckioides*, C. Muell. MSS., nov. sp.—Ad ossas. San José. Julio. (No. 296.)

Pottioideæ.

56. *Trichostomum* (*Leptodontinm*, Hmp.) *pseudo-sulfureum*, C. Muell. MSS., nov. sp.—In silvis primævis ad arbores. Desengaño. Julio. (No. 125.)

57. *T.* (*Anacalypta*) *perpusillum*, C. Muell. MSS., nov. sp.—Ad margines fossarum. San José. Augusto. (No. 356.)

58. *Barbula* (*Senophyllum*, C. Muell. Syn. i., 606) *brachyblepharis*, C. Muell. MSS., nov. sp.—Ad vias prope San José. Junio. (No. 104.)

59. *? Streptopogon calymperoides*, C. Muell. MSS., nov. sp.—In sylvis primævis. Alajuela. Julio. (No. 295.)

60. *Macromitrium lamprocarpum*, C. Muell. MSS., nov. sp.—In truncis vetustis. Alajuela. (No. 116 et 130.)

Hypopterygiaceæ.

61. *Epipterygium Polakowskyi*, C. Muell. MSS., nov. sp.—In pratis udis ad fossas. San José. Junio et Decemb. (No. 291 et 419.)

Hypnoideæ.

62. *Fabronia pilifolia*, C. Muell. MSS., nov. sp.—In truncis vetustis. Savannah de San José. Junio. (No. 111.)

63. *Neckera* (*Leiophyllum*, C. Muell. Syn. ii., 41) *Polakowskyi*, C. Muell. MSS., nov. sp.—In arboribus vetustis. Silvæ primæv. Carpintera. Junio. (No. 107.)

64. *N.* (*Entodon*, C. Muell. Syn. ii., 59) *applanatulus*, C. Muell., nov. sp.—In truncis vetustis. Desengaño. Julio. (No. 128.)

65. *N.* (*Entodon*) *teretiusculus*, C. Muell MSS., nov. sp.—In truncis vetustis. Dèsengaño. Junio. (No. 117 A.)

66. *N.* (*Pterigynandrum*, C. Muell. l.c., 100) *cylindricaule*, C. Muell. MSS., nov. sp.—Ad muros. Cartago. Augusto. Ad arbores. San José. Septemb. (No. 274, 290, et 355.)

67. *N.* (*Papillaria*, C. Muell. l.c., p. 134) *pseudillecebra*, C. Muell. MSS., nov. sp.—In silvis primævis. Angostura. Novemb. (No. 471.)

68. *N.* (*Papillaria*) *Hahnii*, Bescherelle.—In truncis vetustis. Carpintera. Junio. (No. 108 A.)

69. *N.* (*Orthostichella*, C. Muell. l.c., 123) *rigida*, C. Muell. Syn. ii., 126 et 669. (*Pilotrichella rigida*, C. Muell. MSS.)—In truncis vetustis. Carpintera. Junio. (No. 108.)

70. *Pilotrichum* (*Cryphæa*, C. Muell. ii., 163) *costaricensis*, C. Muell. MSS., nov. sp.—In truncis vetustis. Angostura. Novemb. (No. 492.)

71. *Hookeria* (*Lepidopilum*, Brid., C. Muell. l.c., p. 192) *Polakowskyi*, C. Muell. MSS., nov. sp.—In arboribus. Silvæ primæv. Augostura. Novemb. (No. 475.)

72. *H.* (*Lepidopilum*) *phialothecia*, C. Muell. MSS., nov. sp.—In truncis. Desengaño. Julio. (No. 122.)

73. *Plagiothecium chrysobasis*, C. Muell. MSS., nov. sp.—In truncis vetustis. Angostura. Novemb. (No. 495.)

74. *Hypnum* (*Microthamnium*) *reptans*, Sw. (Fl. Ind. Occ. iii., p. 1819), C. Muell. Syn. ii., p. 268.—In truncis vetustis. Desengaño. Junio. (No. 117 B.)

75. *H.* (*Aptychus*, subs. C. Muell. l.c., 325) *crispulifolium*, C. Muell. MSS., nov. sp. In truncis vetustis. Desengaño. Junio. (No. 117.)

76. *H.* (*Tamariscella*, C. Muell. l.c., 482) *lonchopyxis*, C. Muell. MSS., nov. sp.—Cum priore. (No. 119 A et 124).

77. *H.* (*Tamariscella*) *brachypyxis*, C. Muell. MSS., nov. sp.—Cum priore. (No. 119.)

78. *H.* (*Rigodium*, C. Muell. l.c., 418) *Alajuelæ*, C. Muell. MSS., nov. sp.—Cum priore. (No. 121.)

II. Cormophyta, *A. Br.*

Filices, *L.*

(*auct.* M. Kuhn.)

Hymenophylloideæ, Endl.

1. *Trichomanes radicans*, Sw.—Hook. Sp. Fil. i., 125.—In arboribus silvarum primæv. Hacienda de Ramon Gonzalez prope Desengaño. Alajuela. Junio. (No. 162.)

2. *T. reptans*, Sw. Fl. Ind. Occid. iii., p. 127, var. *majus*, Metten.—In arboribus. Carpintera. Junio. (No. 131.)

Polypodioideæ, R. Br.

3 *Gymnogramme tartarea*, Desv.—-Schlecht. Linnæa 5, p. 605. —In silvis primævis Carpinteræ Junio. (No. 98 et 157.)

4. *G. Calomelanos*, Kaulf.—Schlecht. l.c., p. 606.—In declivibus petrosis prope Angostura. Novemb. (No. 422.)

5. *G. ferruginea*, Kunze.—K. in Linnæa, 9, p. 35.—Ad margines silvarum. Angostura. (No. 451.)

6. *Polypodium Friedrichsthalianum*, Kz.—Metten. in Abhandl. d. Senckenb. naturf. Ges., Bd. ii., p. 65. Kz. f. ii., 55, t. 123.—In arboribus silvarum primæv. Carpintera. Junio. (No. 102.)

7. *P. Karvinskyanum*, A. Br., var. β. = *P. plebejum*, Schlecht. —Linnæa 5, p. 607. Metten l.c., p. 66.—Prope San José. Julio. (No. 103.)

8. *P. furfuraceum*, Schlecht. et Cham.—Linnæa 5, p. 607. Metten. l.c., p. 68.—In arboribus prope Cartago. (No. 105.)

9. *P. incanum*, Sw.—Syn. Fil. 35. Metten. l.c., p. 69.—In arboribus prope San José. Julio. (No. 244.)

10. *P. plesiosorum*, Kz.—Linnæa 18, p. 313. Metten. l.c., p. 74.—In arboribus hortorum. Angusto. (No. 251.)

11. *P. lanceolatum*, L.—Plum., t. 137. Metten. l.c., p. 89, sub. *P. lepidotum*, W. Schlecht. adumb. 17, t. 8.—In arboribus prope San José. Junio. Octob. (No. 72, 285, et 359.)

12. *P. percussum*, Cav.—Langsd. et Fisch. Ic. 8, t. 6. Metten. l.c., p. 90.—In silvis primævis. Angostura. Novemb. (No. 421.)

13. *Phegopteris tetragona*, Mett. f. h. Lips. 84.—Metten. l.c., p. 306.—In silvis primævis. Angostura. Novemb. (No. 423.)

14. *Adiantum concinnum*, H. et Bp.—Hook. Sp. Filic. ii., p. 42. —Ad margines hortorum et ad viam ferream prope San José et Alajuela. Junio—Angusto. (No. 53, 54, et 253.)

15. *Pteris aquilina*, L., var. *pubescens*, Sprlg. = *P. lanuginosa*, Schlcht. Linnæa, 5, p. 614. F. Liebmann in "Mexicos Bregner," p. 74.—In silvis. Alajuela. Julio. (No. 209.)

16. *P. pellucens*, Ag.—Tent. pteridogr. 43= *P. longipes*, D. Don. —In silvis primævis. Hacienda de Ramon Gonzalez prope Alajuela. Junio. (No. 163.)

17. *P.*, steril., indeterminab.—In silvis primævis. Angostura. Novemb. (No. 445.)

18. *Blechnum occidentale*, L.—Willd. Spec. Fil. 5, p. 412.—In pratis et ad vias. San José et Cartago. Junio.—Novemb. (No. 69, 252, et 424.)

19. *Asplenium cicutarium*, Sw.—Prod. 130 Metten. l.c., Bd. iii., p. 160.—In arboribus. Carpintera. Julio. (No. 176.)

20. *A. Schkuhrianum*, Pr., t. 107.—Metten. l.c., p. 177.—Silvis primævis. Carpintera. Julio. (No. 151.)

21. *A. furcatum*, Thbg.—Prod. 172.=*A. præmorsum*, Sw. Fl. Ind. Occ. iii., 1620, 2008, s. 183. Metten l.c., p. 203.—In silvis. Alajuela. Julio. (No. 164)

22. *A. celtidifolium*, Mett. f. h. Lips. 75, t. 12, f. 3, 4 Metten l.c., p. 222.—In silvis primævis. Carpintera. Junio. (No. 158.)

23. *A. Skinneri*, Baker in Hook. et Bak. Syn. Fil., ed. 2, p. 226.=*Athyrium*, Moore.—Inter sepes. San José. Augusto. (No. 245.)

24. *Nephrolepis suberosa*, Presl Pterid., p. 79, var. *undulata*, Metten MSS.—Ad margines fossarum. San José. Julio—Septemb. (No. 250, 294, et 325)

25. *N. tuberosa*, Presl, var. *pectinata*, Metten. MSS.—In silvis primævis. Angostura. Novemb. (No. 478.)

26. *Aspidium Balbisii*, Kuhn=*Aspidium Sprengelii*, Kaulf, Flora 1823=*Polypodium Balbisii*, Spreng. Fil. Mant., p. 228.—In silvis primævis. Angostura. Novemb. (No. 276 et 444.)

27. *A. oppositum*, Sw.—Adnot., p. 67 = *Polypodium oppositum*, Vahl.—In pratis udis. Alajuela. Junio. (No. 82 et 90.)

28. *Lindsaya divaricata*, Metten. MSS. = *Davallia Schlechtendalii*, Presl Tent. Pterid., p. 129. Hooker Sp. Fil. 1, p. 189. F. Liebmann l.c., p. 111.—In silvis primævis humidis. Angostura. Novemb. (No. 425.)

29. *Dennstædtia cornuta*, Metten. MSS.=*Dicksonia cornuta*, Klf. Enum. 227. Metten. Annal. Sc. Natur., ser. v., vol. 2, p. 260.—Inter fruticetum. Cartago. Julio. (No. 101 et 210)

30. *D. adiantoides*, Moore.—Ind. Fil. 97 (=*Dicksonia*, H. Bp. Kth.) —In silvis primævis. Carpintera. (No. 152.)

Gleichenioideæ, R. Br.

31. *Gleichenia bifida*, Spreng.—Syst. plant. iv., p. 27=*Mertensia*, Willd. Spec. Pl. v., p. 73. — In silvis primævis. Augostura. Novemb. (No. 413.)

Ophioglossoideæ, R. Br.

32. *Ophioglossum reticulatum*, L.—Hook. et Grev. Ic. Fil., t. 20· —F. Liebman, l.c., p. 153.—Ad fossas. San José. Angusto. (No. 246.)

Lycopodiaceæ.

33. *Lycopodium cernuum*, L.—Sprg. Mon. Lycopd , p. 15.—In silvis primævis. Augostura. Novemb. (No. 408)

Selaginellarum species nondum determinatæ inter literas mortui cl. Alexander Braun inveniuntur.

THE CRYPTOGAMIC FLORA OF KENT.

By E. M. Holmes, F.L.S.

(*Continued from* p. 207.)

Rhyncostegium megapolitanum, *Br. et Sch.* *Hypnum confertum*, var. *megapolitanum* (Wils.) *Hypnum megapolitanum*, Bland (Berk.; Hobk.)

On sandy hedgebanks. Not common. Bry. Eur. v., t. 511.

Rochester Road, Maidstone; *Percy Adams!* Rochester; *Howse!* Near Hayes Common; sands near Deal.

Has much the habit of some forms of *Brachythecium rutabulum*, but is easily known by its complanate branches and distichous leaves, which are twisted at the tip; also by the smooth fruit-stalk and long lid of the capsule. The smooth fruit-stalk also distinguishes it from *E. prælongum* and *E. speciosum.*

R. murale, *Bry. Eur.* *Hypnum murale*, Hedw. (Wils.; Hobk.)

On damp walls and rocks, and on bridges, especially where overshadowed by trees. Frequent. November, December. Bry. Eur. v., t. 514.

Cossington Spring and Fant Woods, near Maidstone; Boughton Monchelsea.

Known from *R. confertum* by its concave obtuse leaves and shining appearance. It adheres very closely to the stones on which it grows.

R. rusciforme, *Br. et Sch.* *Hypnum ruscifolium*, Dill. (Wils.; Berk.; Hobk.)

On stones and stumps in streams, and at the base of damp walls. Frequent. November, December. Bry. Eur. v., t. 515.

In the Darenth, near Farningham; *Howse!* On the cascade at Hothfield, abundantly; on wet sand-rocks, Ightham.

Thamnium alopecurum, *Sch.* *Isothecium alopecurum*, Wils. (Wils.) *Hypnum alopecurum*, Dill. (Hobk.)

On limestone rocks in woods, and on shady walls, usually fruiting only near or in watercourses in woods. Not common. December. Bry. Eur. v., t. 518.

Ightham.

Plagiothecium latebricola, *Br. et Sch.* *Leskea latebricola*, Wils. (Wils.); *Hypnum latebricola*, Hobk.; *Philoscia latebricola*, Berk. (Berk.)

In depressions on the sides of decaying stumps of trees, &c. Very rare. Winter. Bry. Eur. v., t. 494.

Sparingly on a stump near Ide Hill, Sevenoaks. Not observed in fruit.

P. denticulatum, *Br. et Sch.* *Hypnum denticulatum*, Dill. (Wils.; Berk.; Hobk.)

On decaying trunks in damp woods, or on turfy soil among rocks. Very common and very variable. May, June. Bry. Eur. v., t. 501.

Blackheath, and about Woolwich; *Fl. Metr.* Otford; Ightham; Swanscombe Wood; Hythe; Sandling, near Maidstone; Abbey Wood.

P. SYLVATICUM, *Br. et Sch.* *Hypnum sylvaticum*, L. (Wils.; Berk.; Hobk.)

On moist shady banks and rocks. Not common. September. Bry. Eur. v., t. 503.

Abbey Wood; Ightham; in fruit near Bexley.

In looser tufts than the last, and the leaves are lustreless and shrivelled when dry, not firm and shining as in *H. denticulatum*.

P. ELEGANS, *Sch.* *Hypnum elegans*, Hook. (Wils.; Berk.; Hobk.)

On rocks, chiefly of siliceous character. Rare. March, April. Bry. Brit., t. lix.

Ightham; not observed in fruit.

P. UNDULATUM, *Br. et Sch.* *Hypnum undulatum*, L. (Wils.; Berk.; Hobk.)

On damp sloping banks in woods, among heath, or at the foot of rocks, &c. Frequent. April, May. Bry. Eur. v., t. 506.

Shooter's Hill, Dillenius; *Bot. Guide.* Blackheath; *Fl. Metr.* Knole Park, Sevenoaks; *Jenner Fl. Tunbr.!* Wood near Selling; Abbey Wood, abundantly; not observed in fruit.

P. SILESIACUM, Bry. Eur. *Hypnum silesiacum*, Seliger MSS. (Wils.; Berk.; Hobk.)

On decayed stumps of trees. Very rare. April, May. Bry. Eur. v., t. 500.

Abbey Wood, near Plumstead, Kent, April, 1843; W. Mitten, *Bry. Brit.*, p. 405.

Joyden's Wood near Bexley, sparingly; *Howse!*

I have myself gathered this rare species abundantly in fruit in Mr. Mitten's locality in 1875 and 1876. It is very similar in habit to some forms of *H. cupressiforme*, but the stems taper, are somewhat arched, and are not pinnately branched.

AMBLYSTEGIUM SERPENS, *Br. et Sch.* *Hypnum serpens*, L. (Wils.; Berk.; Hobk.)

At the foot of decaying trunks of trees and on stones in hedgebanks. Very common. May, June. Bry. Eur. vi., t. 564.

Abbey Wood; Fant Woods, near Maidstone.

[*A. radicale*, Br. et Sch. (*Hypnum varium*, Sull.), which has been found in Sussex near Hurstpierpoint, should be looked for in Kent, in damp sandy places, on stumps of trees, &c. The leaves are nearly twice as large as those of *H. serpens*, and of a duller more lurid green colour and opaque, and the plant has a more rigid appearance.]

A. IRRIGUUM, *Sch.* *Hypnum irriguum*, Hook. et Wils. (Wils.; Berk.; Hobk.)

On damp places and by the sides of streams on the chalk, and on limestone. Frequent. May. Bry. Eur. iv., t. 566 (*A. fluviatile*).

Farningham; *Howse!* Cossington Spring, near Maidstone; Greenhithe; Otford, on a damp bank in a field; Hothfield, in company with *A. riparium*, by the sides of the artificial lake.

Differs from *H. filicinum* in its duller green less falcate leaves, only the extreme tips of the branches being secund.

A. RIPARIUM, *Br. et Sch. Hypnum riparium*, L. (Wils.; Berk.; Hobk.)

On damp soil occasionally inundated, and on woodwork by the side of canals and rivers. Frequent. May, June. Bry. Eur. vi., t. 570.

Farningham; *Howse!* Sturry Marshes, near Canterbury; Hothfield, in fructification.

Known from the allied species by its large complanate loosely imbricated leaves.

HYPNUM SOMMERFELTII, *Myrin. H. polymorphum*, Hedw. (Wils.; Berk.; Hobk.)

On roots of trees and stones in chalky districts. Common. May. Bry. Eur. vi., t. 582.

Greenhithe, in the chalk quarries; on banks near High Elms, Chelsfield; Sandling, on a shady limestone wall; Tovil, and Fant Woods, near Maidstone; Otford; on the Undercliff, Folkestone.

Distinguished from *H. chrysophyllum* and from *A. serpens* by its nerveless leaves, broad at the base and suddenly acuminated.

H. ELODES, *Spruce.*

Amongst grass around the edges of shallow pools in sandy places near the sea. Rare. April, May. Journ. Bot., April, 1845. Rare in fructification.

In fruit abundantly near the coastguard station near Sandwich, April, 1876.

Intermediate in habit between *A. serpens* and small states of *E. prælongum*. It is easily distinguished by the leaves being denticulate near the base only. The nerve reaches nearly to the apex, and the calyptra is white, as in *A. serpens*. Wilson's figure in Bry. Brit., t. lvi., does not agree with his description on p. 362.

H. CHRYSOPHYLLUM, *Brid.*

On damp hedgebanks and on rubble heaps in chalky or limestone districts. Frequent, the fruit very rare. May. Bry. Eur. vi., t. 583.

North Fright Wood, near Tunbridge; *Howse!* Wrotham; Dunton Green; Otford; Maidstone; abundant on the Undercliff, Folkestone, not observed in fruit.

H. STELLATUM, *Schreb.*

In bogs on heaths and near woods and damp places on the chalk. Frequent. June. Rarely in fruit. Bry. Eur. vi., t. 584.

Boggy places on Tunbridge Wells Common, &c.; *Jenner Fl. Tunbr.* Great Dundale Wood; Dover, not observed in fruit; Bexley.

Easily distinguished from *H. chrysophyllum* by the absence of a nerve, and by the large areolæ at the base of the leaf.

H. ADUNCUM, *Hedw.*

Var. γ. *Kneiffii*, Sch. Syn., ed. ii. *H. Kneiffii*, B. & S. (Wils.; Berk.; Hobk.)

In marshy meadows amongst grass. June. Bry. Eur. vi., t. 573.

In a boggy meadow below Hill Park, Westerham.

H. LYCOPODIOIDES, *Schwgr.* *H. aduncum*, β. *rugosum*, Hook. & Tayl. (Jenner Fl. Tunbr.)

In bogs and marshy places. Rare in fruit. June. Bry. Eur. vi., t. 613, 614.

Tunbridge Wells Common.

H. EXANNULATUM, *Gumb.*

In boggy places and by the sides of stagnant pools. Not common. May, June. Bry. Eur. vi., t. 602.

North Fright Wood; *Howse!* Keston Common, not observed in fruit.

This species differs from *H. fluitans* in its more falcate leaves distinctly auricled at the base, and from *H. aduncum* in the more shining leaves and capsule destitute of annulus.

H. FLUITANS, *L.*

In stagnant water. Frequent, rare in fruit. April, June. Bry. Eur. vi., t. 602.

Rusthall Common; Lower Green; *Jenner. Fl. Tunbr.* Swanscombe Wood; Keston Common. North Fright Wood; *Howse!*

[*H. revolvens*, which has purple strongly falcate leaves and a rigid habit should be looked for in bogs in Kent.]

H. FILICINUM, *L.*

On wet banks, and on stones in rivulets. Frequent, the fruit very rare. April, May. Bry. Eur. vi., t. 609.

About Northfleet and Gravesend; Chiselhurst; *Fl. Metr.* Greenhithe; Southborough.

This species closely resembles *A. irriguum*, but the leaves are more falcate and distinctly secund, and the colour of the tufts is more of a yellowish or brownish green.

H. COMMUTATUM, *Hedw.*

In rivulets on a calcareous soil. Rare. April. Bry. Eur. iv., t. 607.

In a rivulet in a boggy copse, Southborough, not observed in fruit.

H. CUPRESSIFORME, *L.*

On stumps of trees, stones, and on hedgebanks, &c. Very common and very variable. December. Bry. Eur. vi., t. 594.

Abbey Wood; Shoreham.

Var. *ericetorum.*

Abbey Wood; Maidstone; Ightham.

H. RESUPINATUM, *Wils.* *H. cupressiforme*, var., Berk.

On trees and in hedgebanks. Frequent. December. Bry. Brit., t. xxvii.

Keston; *Howse!* Abbey Wood; Edenbridge; Otford; Greenhithe; Ightham; Southborough; Egerton; St. Paul's Cray Common; Rusthall Common.

H. LINDBERGII, *Mitt.* *H. pratense*, var. β, (Wils.; Berk.)

Amongst grass in damp places by roadsides in hilly districts. Rare. Not observed in fruit in Britain.

Ide Hill, near Sevenoaks; Westerham; Great Dundale Wood, near Tunbridge Wells, abundant.

Very like *H. cupressiforme*, but of a paler colour, erect and scarcely branched; the leaves are entire, and the cells at the basal angles enlarged and pale. See Journ. Bot., 1864, p. 122.

H. MOLLUSCUM, *Hedw. Hypnum repens filicinum crispum*, Ray Syn. iii., p. 85. *Hypnum Crista castrensis*, Roth. (Fl. Metr.)

Common on the chalk and in calcareous districts. Rare in fruit. November. Bry. Eur. vi., t. 598.

On chalky hills between Northfleet and Gravesend, where the Orchids grow. *Ray Syn.* l.c. Morant's Court Hill and elsewhere on the chalk; *Jenner Fl. Tunbr.* Abbey Wood; Otford.

This species is easily distinguished from *H. commutatum* by its leaves being faintly two-nerved at the base, *H. commutatum* being nerved more than halfway. In the latter also the points of the leaves are crisped or undulate when dry.

[*H. imponens*, which has been found in the New Forest and in Surrey, should be looked for in Kent, on bare spots in damp heathy places. The leaves have large alar cells, and there are small paraphyllia between the leaves.]

H. CORDIFOLIUM, *Hedw.*

In marshy places in or near woods. Rare. April, May. Bry. Eur. vi., t. 615.

North Fright Wood, near Tunbridge; *Howse!*

Known from *H. cuspidatum* by its loosely-set spreading leaves, which are nerved almost to the apex.

H. CUSPIDATUM, L. *Hypnum repens palustre foliis triangularibus per caules expansis extremitatibus convolutis et acuminatis*, Ray Syn. iii., p. 82.

In damp places by roadsides and ditches, &c. Common. May, June. Bry. Eur. vi., t. 619.

In the bog near Charlton; *Ray Syn.*, l.c. Charlton Wood; *Fl. Metr.* Greenhithe; Ide Hill, near Sevenoaks; Postling, mixed with *H. piliferum;* Otford; Keston; Maidstone.

Known from *H. piliferum*, which it much resembles in habit, by its nerveless leaves.

H. PURUM, *L.*

On banks and grassy places. Common everywhere; the fruit rather rare. October, November. Bry. Eur. vi., t. 621.

In fruit in a quarry near Long Beech Wood, Charing; *George!* Ightham; in fruit near Chelsfield; Brenchley; Great Dundale Wood; and abundantly on the Undercliff, near Folkestone.

H. STRAMINEUM, *Dicks.*

In spongy bogs. Rare. April, May. Bry. Eur., vi., t. 617.

In bogs at Fisher's Castle, without fruit; *Jenner Fl. Tunbr.* This locality has since been drained, and all the bog Mosses have disappeared.

Known from *H. cuspidatum* by its slender sparingly branched stems, and by the leaves being nerved beyond the middle.

H. POLYGAMUM, *Sch.*

In marshy sandy places, chiefly near the sea. June. Bry. Eur. vi., t. 572.

Marshy ground among the sandhills near Deal.

PLEUROZIUM SCHREBERI, Lindb. *Hypnum Schreberi*, Willd. (Wils.; Berk.; Hobk.)

In heathy places and in sandy woods. Frequent. October, November. Not observed in fruit in Kent. Bry. Eur. vi., t. 620.

Darenth Wood; Keston Common; Bostol Heath; Ightham Common; Wrotham, &c.

Known from *H. purum*, *H. cuspidatum*, and *Hylindrothecium Montagnei* by its red stems, which are perceptible through the leaves.

P. SPLENDENS. *Hypnum splendens*, Hedw. (Wils.; Berk.; Hobk.)

On heaths and in woods in hilly districts. Not common.

King's Wood, near Maidstone; Thornden Wood, near Canterbury; near Deal.

HYLOCOMIUM BREVIROSTRE, *Sch.* *Hypnum brevirostre*, Ehrh. (Wils.; Berk.; Hobk.)

On stones and rocks and stumps of trees in woods in subalpine districts. Rare. December. Bry. Eur. v., t. 493.

Hungershall rocks, with fruit; between Langton Green and Speldhurst and elsewhere, without fruit; *Jenner Fl. Tunbr.*

Very similar in appearance to *E. striatum*, but distinguished by the red stems, and by the short conical not beaked lid of the fruit.

H. SQUARROSUM, *Sch.* *Hypnum squarrosum*, L. (Wils.; Berk.; Hobk.)

In damp places amongst grass. Common; rare in fruit. November. Bry. Eur. v., t. 492.

Sevenoaks; Chislehurst; Maidstone; Greenhithe; Abbey Wood, &c.

H. TRIQUETRUM, *Sch.* *Hypnum triquetrum*, L. (Wils.; Berk.; Hobk.)

In shady woods and thickets. Very common; rare in fruit. December. Bry. Eur. v., t. 491.

In fruit in a chalk quarry near Charing; *George!* King's Wood; Dunton Green; Otford; Greenhithe, &c.

H. LOREUM, *Sch.* *Hypnum loreum*, L. (Wils.; Hobk.)

In shady woods and thickets, and among rocks. Not common; rare in fruit. December. Bry. Eur. v., t. 490.

In Knole Park, bearing fruit abundantly; *Jenner Fl. Tunbr.* In a chalk quarry near Charing, in fruit; *George!*

Known from *H. squarrosum*, which it much resembles, by its secund leaves and loose prostrate habit.

CYLINDROTHECIUM CONCINNUM, *De Not.* *Cylindrothecium Montagnei*, Br. et Sch. (Wils.; Berk.; Hobk.)

On shady banks in chalky or limestone districts. Not common, or often overlooked; often growing in company with *H. purum*. Not observed with fruit in Britain. Autumn. Bry. Eur. v., t. 469 (*C. Montagnei*).

Near Otford; *Howse!* Bluebell Hill, near Maidstone; Wrotham.

Closely resembles *H. purum* in habit and foliage, and is with difficulty distinguished by the eye alone. The branches have the leaves more appressed and somewhat cuspidate towards the apex, so that they resemble those of *H. cuspidatum* at the apex. The small forked nerve, which is sometimes absent altogether, distinguishes at once under the microscope.

ON BOBART'S GREEN *SCROPHULARIA*.

By R. A. Pryor, B.A., F.L.S.

A remarkable form of *Scrophularia*, distinguished by the green colour of its flowers, was first introduced to the notice of botanists by Bobart in the second edition of the "Synopsis" of Ray. It is described in the following terms:—

"4. *Scrophularia major, caulibus foliis & floribus viridibus. D. Bobert.* Figwort with green leaves and flowers. Found near *Cumner* Common. Figwort is called Brownwort, from its remarkable brown colour. This hath nothing of brownness in it."*

The same plant was gathered afterwards by Blackstone,† but I am not aware of any other record of its occurrence in England. It would appear to have excited considerable attention at the time, but subsequently dropped out of notice. It is not mentioned either by Hudson or Withering, and was referred by Smith to *S. nodosa*, L., as a variety‡ "which should seem to be paler-flowered, in consequence perhaps of a more shady situation."§ It has been entirely omitted from the writings of our modern descriptive botanists,‖ and I do not know that it has been noticed by foreign authors.¶

Latterly, however, and in publications of a less authoritative nature, it has been usual** to identify the plant of Bobart with *S. umbrosa* of Dumortier,†† which on these grounds has been inserted in at least one county list. An examination of the original specimens will show that this determination is erroneous.

The interesting collection preserved in the Oxford Garden contains three examples which may be regarded as authentic. One, possibly the original plant from Cumnor, is preserved in the herbarium of Dubois‡‡; a second (placed there by Bobart himself?) in that of Morison; and a third among Sherard's European plants. A fourth example "ex ipsissimo Bobart" is contained in the valuable hortus

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* R. Syn., ed. 2, p. 161.

† Spec. Bot., p. 91. He adds, "Its leaves are of a pale green, and the whole plant is much smaller than the *common Figwort*."

‡ Fl. Br., v. ii., p. 663.

§ Eng. Fl., ed. 2, v. iii., p. 138.

‖ Babington alludes to a variety of *S. nodosa* with "*milk-white*" flowers (Manual, ed. 7, p. 257).

¶ Koch, however (Syn., ed. i., p. 515), describes the flowers of *S. nodosa* as "raro ubique virentes," and Boreau (Fl. du Cent., ed. 3, v. ii., p. 480) speaks of a very rare form "à fleurs jaunes."

** This identification was first, I believe, suggested, at least in print, by the late Dr. Bromfield, who considers that *S. Ehrharti* was "unmistakeably pointed out" out in the passage of the "Synopsis" above quoted. Cf. Phytologist O.S., v. 3, p. 628 (1849.)

†† *S. umbrosa*, Dumrt. (1827), has clearly precedence over *S. Ehrharti*, Stev. (1840). Dumortier states (Opuscules, pp. 330 sqq.) that *S. alata*, Gilib., taken up in the Student's Flora, is merely a synonym for *S. aquatica*, L., in its wider sense. It is worth mentioning that there is an Irish specimen of *S. umbrosa*, labelled however *aquatica*, in the herbarium of Mr. I. Carroll, now incorporated with the British Museum Collection. The previous records appear to have been untrustworthy. Cf. Cyb. Hib., p. 209.

‡‡ "Found near Cumnor" on the label is probably only a continuation of the quoted description from Ray.

siccus of Buddle,* which forms part of the treasures of the British Museum. These authoritative specimens leave no room for doubt that the green *Scrophularia* is a form or variety of *S. nodosa*, L.

Towards the latter end of the past summer I was fortunate enough to meet with living examples of a plant which I have no hesitation in identifying with that of Bobart. The station, near Rickmansworth, is interesting as being in the same neighbourhood as that recorded by Blackstone.† My specimens agree precisely with that contained in Dubois' collection, which is better preserved, and perhaps more completely developed than the others.

The whole plant is of a light bright green; the foliage that of *nodosa*, perhaps rather more luxuriant than usual; the bracts, on the other hand, although variable, for the most part smaller than in the typical plant; the stem is altogether that of *nodosa*. The panicle is large and well furnished; the calyx entirely green, with barely a trace of the usual scarious margin, and divided almost to the base into five narrow lobes; the corolla is also entirely green, and in some instances departs considerably from the normal shape, having five subequal segments and a somewhat campanulate figure. The stamens and staminode do not, so far as I am aware, present any particular points of difference; but the malformed corollas are accompanied by greatly elongated capsules, sometimes an inch long, of a leafy texture and conspicuously veined. These are open at the top, and filled inside with a series of foliaceous laminæ. I have not been able to ascertain whether perfect seeds are ever produced. The fresh plant is not without some claims to beauty.

It will be evident from this description that Bobart's green *Scrophularia* is rather, perhaps, a monstrosity than a variety properly so called; should it, however, be thought worthy of a special designation, I venture to propose that of *Bobartii*—*S. nodosa*, var *Bobartii*.

ON *CARUM BULBOCASTANUM*, KOCH, IN BUCKINGHAMSHIRE.

By R. A. Pryor, B.A., F.L.S.

Carum Bulbocastanum was first detected in England in 1835, by the late Rev. W. H. Coleman, at Cherry Hinton, in Cambridgeshire. Five years later the same acute botanist discovered it, almost on the same day, in Hertfordshire and Bedfordshire; and I have now the pleasure of adding a fourth county to the list.

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* Buddle has left his own opinion on record. "Scrophularia, &c. . . . D. Bobart, a quo etiam habui. I look upon it as a pretty variety (*i.e.*, of the common Figwort), but do scarce think it a distinct species." (Sloane MSS. 2975 b., fol. 30.)

† "In the shady Woods between Harefield, and Chalfont St. Peter's." (Spec. Bot., 91.)

During a recent excursion to the eastern borders of Buckinghamshire, in company with the Rev. W. W. Newbould, it was our good fortune to meet with this interesting accession to the flora in considerable abundance between Eddlesboro' and Ivinghoe, immediately at the base of the steep escarpment of chalk which extends from Dunstable towards Ivinghoe, and is thence prolonged into the Chiltern range. It was there growing both on the grassy margins of the trackways, and in far greater quantity among the cereal crops, on the same soil, the chalk marl, and under the same circumstances as in Herts and Beds. While thus an addition to the flora of the county, and to that of the West Thames subprovince of Mr. Watson's Cybele, the general distribution of the plant, except for the arbitrary limits of political geography, is but little affected. Its extension is perhaps rather apparent than real, and might not unreasonably have been anticipated.

The Eddlesboro' station is, however, as at present known, the most westerly in England. The district is drained by the Ousel, a tributary of the greater Ouse. As but little is known of the botany of North Buckinghamshire, I append a list of the more interesting plants that were observed on the same occasion :—

Ranunculus arvensis, L.
Papaver Argemone, L.
,, *Lecoqii*, Lamot.
Fumaria parviflora, Lamk.
Helianthemum vulgare, Gærtn.
Viola Riviniana, R.
Polygala depressa, Wend.
Silene puberula, Jord. (the only form seen).
Arenaria leptoclados, Guss.
Cerastium arvense, L.
Ononis arvensis, L.
,, *campestris*, Koch.
Anthyllis Vulneraria, L.
Hippocrepis comosa, L.
Rosa micrantha, Sm.
Asperula cynanchica, L.
Galium tricorne, L.
Carlina vulgaris, L.
Carduus acaulis, L.
Campanula glomerata, L.
Specularia hybrida, A.DC.
Lithospermum arvense, L.
Origanum vulgare, L.
Thymus Chamædrys, Fries.
Phleum præcox, Jord.
Avena pubescens, L.
,, *pratensis*, L.
Kœleria cristata, Pers.
Sclerochloa rigida, Link.
Festuca ovina, L.
Bromus erectus, Huds.
,, *commutatus*, Schrad.

Of these, *Fumaria parviflora*, *Galium tricorne*, *Avena pratensis*, and *Bromus commutatus* are not given in the printed list of Buckinghamshire plants that was issued by Mr. Britten about ten years back.

I have learned from Mr. Watson that *Fumaria parviflora* at all events is new to the Buckinghamshire Flora.

BUXUS SEMPERVIRENS, L., IN BUCKINGHAMSHIRE.

By R. A. Pryor, B.A., F.L.S.

My attention has long been drawn to a statement in the third edition of Withering (v. ii., p. 210.),* on the authority of Woodward, that *Buxus sempervirens* occurred "in plenty on the Chalk Hills, near Dunstable." No mention is made of this by Abbot, and I am not aware that the subject has been discussed by any recent writer. I have myself searched the chalk range near Dunstable in vain. A short time back, however, my eye was caught by a repetition of the same statement by the late Mr. J. S. Mill in the new series of the Phytologist,† and although it is not quite clear that the eminent logician had personally visited the locality more immediately in question, some further examination appeared to be desirable. Upon inquiry at Eddlesboro'‡ I found that the occurrence of Box on the downs was well known in the neighbourhood, and by following the directions there given, I was able to satisfy myself of its existence in large quantity on the north-eastern slopes of Steps Hill, above Ward's Combe, about three miles to the south of the village. Although I have no doubt whatever that the *Buxus* had been originally planted, probably by one of the Dukes of Bridgewater, it is now as thoroughly established and as wild-seeming as many of the denizens of our woodlands. It forms large clumps, intermixed occasionally with Beech and Hawthorn, of from fifty to a hundred bushes rather than trees, and from twelve to fifteen feet or even more in height, with crowded tortuous stems, a result possibly of their having been at some time formerly felled. I did not notice any seedlings, but the larger examples especially were in the most healthy and luxuriant state, and had not altogether the facies of the garden shrub. Besides the detached clumps which were scattered over the declivities, the Box occurred abundantly in the form of spurs and outliers to a Beech wood of considerable extent, which filled the upper part of the valley, and had evidently been introduced with an eye to picturesque effect. The result was undoubtedly very striking. On the naked summit of the down was a colony of *Ulex europæus*, with *Rubus idæus*, *Senecio silvaticus*, and *Veronica officinalis* growing beneath its shelter, which seemed rather out of place in such a situation, and had originally, I imagine, been introduced with the Furze.

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* Quoted by Sir. J. E. Smith in "English Botany," no. 1341; "Flora Britannica," v. iii., p. 1014; and "English Flora," ed. 2, v. iv, p. 133.

† "*Buxus sempervirens* helps to adorn the steep chalky declivities near Ellesborough, and grows also on the hills between Tring and Dunstable." (Phytologist, n.s., v. i., p. 331.)

‡ Near Ivinghoe. This must not be confounded with Ellesboro' in the south of the county, which is mentioned by Mill in the paragraph just referred to (Phyt., l.c.), and where the abundance of Box was long since noticed by Lysons. "A tract of land on the Chiltern Hills, extending from the Beacon Hill, in Ellesborough, across the parish of Little Kimble into that of Great Kimble, and containing more than 100 acres, is covered with Boxwood, which appears to be the natural growth of the soil." (Magna Britannia, v. i., pt. 3, p. 476 (1813)). There is a Beacon Hill also at Eddlesboro'.

It is not very easy to decide whether these are the actual Box-trees observed by Woodward, in which case they must be over a century old,* and they have quite the appearance of having occupied their present position for as long a period. There can be little doubt, however, that they are those alluded to by Mill. There is a farm or hamlet of Boxtead (in Beds) marked in the ordnance map at no very great distance, but no bush of any kind could be discerned on the bare face of the hill.

BOTANICAL NOMENCLATURE.

Vous avez bien voulu donner, dans le cahier de Juin du "Journal of Botany" (p. 189), un extrait de de ma lettre à M. Cogniaux sur des questions de nomenclature, et je vois avec plaisir que vous approuvez ce que j'ai dit. L'article contient cependant, vers la fin, une phrase dans laquelle vous m'attribuez une opinion bien différente de la mienne. Vous dites (p. 190): "A point worthy of special note in the matter is this: that M. de Candolle assumes, as a basis of his argument, that an author who transfers a species to another genus is in no way bound to adopt the specific name which it previously bore." J'ai toujours soutenu, au contraire, conformement au "Recueil des lois" recommandées par le Congrès botanique de Paris (art. 53, 57, 62), et à l'usage de la plupart des botanistes modernes, qu'en transférant une espèce d'une genre dans un autre on doit conserver le même nom spécifique, seulement il y a des cas dans lesquels cela n'est pas possible. Ces cas sont rappelés dans ma lettre et également dans votre extrait (p. 189, au bas). Le premier botaniste qui, en proposant ou admettant la réunion d'un genre à un autre, examine aussi la nomenclature des espèces, doit vérifier si les anciens noms de chaque espèce transférée peuvent être conservés selon la règle, ou si par exception, à cause d'une nécessité évidente, comme de n'avoir pas deux espèces de même nom dans un même genre, il ne faut pas créer de nouveaux noms spécifiques. Il le fait sous sa propre responsabilité. En cela il est libre, mais les autres botanistes sont libres aussi d'adopter sa nomenclature ou de la rejeter, suivant quelle leur paraîtra conforme ou opposée aux règles basées sur la réflexion et les usuages.—ALPH. DE CANDOLLE.

We are greatly indebted to M. de Candolle for the above further clear definition of his views on this practically important question. It may, however, be expected that, in this country at least, they will not meet with such general acceptance as those to which we called attention last month. Probably all botanists are agreed that it is very desirable to retain when possible old specific names, but some of the best authors do not certainly consider themselves bound by any generally accepted *rule* in the matter. Still less will they be inclined to allow that a writer is at liberty, as M. de Candolle thinks, to reject the specific appellations made by an author whose genera are accepted,

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* Woodward was in the neighbourhood of Berkhampstead, probably as a visitor at Ashridge, in 1779. (Cf. Withering, Arrangement, ed. 3, v. iii. p. 627, s.v. *Ononis arvensis*.)

in favour of older ones in other genera. It will appear to such that to do this is to needlessly create in each case another synonym. It is, however, much to be desired that the practice of botanists should be harmonised.—[*Ed. Journ. Bot.*]

SHORT NOTES.

Cardamine amara, *L.*, in Herts.—There is no record of the occurrence of *Cardamine amara* in Hertfordshire for more than fifty years, and the authors of the "Flora Hertfordiensis" had never seen a living specimen. During the past month I have observed it in many places between Rickmansworth and Harefield, and in considerable abundance. It is no less common in the adjacent portion of Middlesex, where, *i.e.*, at Harefield, it does not seem to have been noticed since the time of Blackstone.—R. A. Pryor.

Vallisneria spiralis.—I have recorded in the "Transactions" of the Linnean Society (2nd series, Botany, vol. i., p. 133) some observations with regard to the extraordinarily rapid growth of the female flower-stalk of this plant. It seemed to me at the time that, remarkable as that growth was, it was in all probability retarded by the constant manipulation necessary in performing the frequent sectional measurements. This impression is confirmed by observations made during the present month. The first flower-bud made its appearance in my aquarium this year on July 1st, the pedicel being at 3 p.m. apparently about 1·5 inch long. On the 3rd inst., at 4 p.m., the base of the bud just touched the surface of the water, and the pedicel was about 7 inches long. The next measurement was made at 1 p.m. on the 7th (an interval of ninety-three hours), when it had reached the astonishing length of 43 inches. The bud was then still closed, and the flower-stalk quite straight, *i.e.*, not showing yet any tendency to coil. At 10 a.m. on the 9th the length was 45·5 inches, the flower being then open, and the lower half of the flower-stalk so strongly undulating that it was almost impossible to straighten it. At 11 a.m. on the 10th it had reached its ultimate length of 48 inches, the undulation of the lower portion being more strongly marked. The two last measurements are certainly understated, owing to the impossibility of completely straightening the flower-stalk. Up to the present time, July 14th, no second female flower has made its appearance, nor any male flower, although I have male plants sent to me from Germany.—Alfred W. Bennett.

Extracts and Abstracts.

REPORT FOR THE YEAR 1876 OF THE HERBARIUM OF THE ROYAL GARDENS AT KEW.

By J. D. Hooker, K.C.S.I., M.D., F.R.S.

The new building for the accommodation of the Herbarium is in a very advanced state. It will consist of a hall attached to the back

of the present house. The whole of the latter will be preserved, except the drawing-room, a single apartment that was added on to its north side, and which has been removed to make room for the new hall, which is 86 feet long by 40 feet broad, and contains two galleries 10 feet broad running round it. The galleries will communicate with each other and with the ground floor by two circular iron staircases placed one at each end of the building. On each floor there will be an entrance from the old building, closed by double iron fireproof doors. The long sides of the building will be lighted with forty-eight windows, eight on each floor on each side. The cabinets for holding the specimens will be arranged in blocks 8 feet high, of two tiers projecting like buttresses between the windows on the ground floor and galleries, thus accommodating the greatest number of cabinets with the least loss of space, a very important consideration considering the extent of the collection and the time that would be otherwise lost in consulting it. At the present time the number of cabinets is upwards of 600, and the estimated number of specimens contained in the whole is now considerably over a million, reckoning as one all the individuals of the same plant from the same locality.

The whole building will be heated with hot water pipes. Water-mains charged at high pressure sufficient to throw a jet more than the height of the whole building will be carried to each floor. When complete the old building will be cleared out, as much as possible of its combustible fittings and woodwork removed, and the rooms arranged for the better accommodation of the library and of persons, besides the staff, engaged in the study of the collections.

Very extensive collections and contributions have been received at the Herbarium (chiefly by gift) during the past year.

In accordance with the will of the late J. J. Bennett, F.R.S., Keeper of the Botanical Department of the British Museum, the Australian Herbarium of his predecessor, Robert Brown, made during Flinders's survey of the coasts of Australia, is being divided between the British Museum (which retains the first set), the Herbarium of the Royal Gardens, and that of the Edinburgh Botanic Garden. The first instalment of this valuable collection has been received, and comprises nearly 900 species.

The Herbarium of the late Giles Munby has been presented by his daughters, and is of great extent and value, especially as regards the Algerian Flora, of which he was, after Shaw and Desfontaines, the first efficient explorer. This Herbarium is not only very extensive, but is the authority for the only complete list of the Algerian Flora which has hitherto been published, of which three editions in all have appeared (1847, 1859, 1866), comprising descriptions of various new species.

Very considerable and important accessions continue to be derived from the herbarium formed by Baron von Mueller, in Victoria, which is transmitted to the Royal Gardens in furtherance of the "Flora Australiensis," with the permission to retain duplicates. There is certainly no part of the world of equal extent and possessing as much of interest as Australia, which has through the almost unaided exer-

tions of one man been so successfully explored botanically as has this by Baron von Mueller.

H.R.H. the Prince of Wales has graciously presented the herbarium formed by his botanical collector (Mr. Mudd) during his visit to India.

The botanical collections of the *Challenger* Expedition made by Mr. Moseley have all been received at Kew, and have been for the most part arranged and distributed. Those received during the past year have been chiefly from Japan, the Society and Sandwich Islands, Juan Fernandez, Chili, and Patagonia.

The most important remaining contributions are especially noticed below under the different geographical headings. The figures in brackets denote the number of species received from each contributor.

EUROPE.—Baker, J. G. ; critical sets of *Rosa*, *Rubus*, *Hieracium*, and *Mentha*. Barcelli, M. ; rare plants of Balearic Islands (6). Berkeley, Rev. M. J. ; collection of Sowerby's plates of Fungi. Cooke, M C ; British Fungi (purchased, 200). Crombie, Rev. J. M. ; British Lichens (purchased, 100). Geheeb, A. ; European Mosses (100). Henriques, J. A. ; Portuguese plants (130). Husnot, M. ; French Mosses (650). Jaeggi, J. ; Swiss Alpines (27). Leeds, E. ; cultivated plants (782). Lindsay, Dr. Lauder ; Icelandic plants (173). Phillips, W ; Elvellacei Britannici (purchased, 50). Rabenhorst, Dr. ; *Algæ* (purchased 50). Reinsch, Prof. ; Microscopic *Algæ* (purchased, 227). Sanio, Dr. Karl ; European plants (21). Thuemen, Baron ; Mycotheca universalis (purchased 300). Trevelyan, Sir W. C., Bart ; Portuguese plants (381). Other contributions were received from Burr, Higford ; Darwel, Rev. L. ; Eaton, Rev. A. E. ; Elwes, H. J. ; Ellacombe, Rev. H. N. ; Fisher, H. S. ; Groves, H. ; Inchbald, P. ; Jackson, B. D. ; Leighton, Rev. W. A. ; Ley, Rev. A. ; Lucas, A. E. ; Lyell, Mrs. H. Masters, Dr. ; Maw, G. ; Purchas, Rev. W. H.

ASIA.—Aitchison, Dr. ; N.W. India (19). Danford, Mrs. ; spring plants of Cilician Taurus including a new *Xiphion* and a new *Crocus*, described by Mr. Baker, Journal of Botany, 1876, pp. 265. 266 (20). Dodgson, Col. ; Sikkim and Khasia Ferns (35) Dickins, F. V. ; Japan (400). Floyer, E. Ascoghe ; Persian Gulf (107). Forbes, F. H. ; China ; novelties described by Mr Hemsley, Journal of Botany, 1876, pp. 205, 210 (35). Godefroy-Lebeuf, A. ; Cambodian Orchids Hance, Dr., China ; &c. (152). Harrington, Prof. ; Philippines and Formosa, collected by Prof. Steere ; Ferns described by Prof. Harrington in a paper communicated to the Linnean Society (170). Parish, Rev. C. ; very valuable specimens (including fruits) and drawings of Moulmein Orchids (45). Woodrow, G. M. ; Bombay (20). Other contributions have been received from Annesley, Capt. R.A. (Aden) ; Gammie, J. ; Waterfield, W. ; Levinge, H. C. ; Hutchinson, Major ; Thwaites, Dr. ; Bushell, Dr. (Pekin) ; Franchet, A. (Japan).

AFRICA.—Barber, Mrs. ; Diamond-fields (50). Barkly, H.E. Sir H. and Lady ; Stapelias, &c., in spirits, and drawings Bolus, Harry ; Cape of Good Hope (300). Cosson, Dr. ; Algeria (110). Delville-Cordier, A. ; cultivated Eucalypti of Algeria (39). Eaton, Rev. A. E. ; Lichens and Algæ of Cape of Good Hope ; the former described by Rev. J. Crombie, Journal of Botany, 1876, pp. 18-21. Geheeb, A. ; Mosses of Comoro Islands. Hildebrandt, Dr. ; Comoro Islands

(purchased, 145). Horne, J.; Mauritius (50). Hurst, H. A.; Egypt (39). Macowan, P.; South Africa, chiefly Transkei (100, and drawings of Stapelias, &c.); the new bulbous plants described by Mr. Baker, Journal of Botany, 1876, pp. 181-184. Pool, W.; Madagascar Ferns (163); this collection included 27 new species, described by Mr. Baker in the Journal of the Linnean Society, vol. xv., pp. 411-422. Sanderson, J.; Gold-fields. Other contributions were received from Calvert, H. H.; Kirk, Dr. (Zanzibar); Masters, Dr.; Ascherson, Dr.; Owsl, Miss (Madagascar).

AMERICA.—*North.*—Austen, Mrs.; California (157). British Boundary Survey (46). Gray, Prof. A.; miscellaneous (200). Lefroy, H.E., Major-General; Bermuda (16). Lippincott, T. S.; California (62).——*South.*--Glaziou, A.; further Brazilian collections, which are of especial value, as the numbers are cited in the Flora of Brazil (560). Higgins, Rev. H. N.; W. Indian Cryptogams (144). Husnot, W.; W. Indian Mosses (111). Jenman, G. S.; Jamaica (43). Sodiro, Father P. L.; Ecuador Ferns (422); a remarkably fine collection, comprising 15 new species, which will be described by Mr. Baker in the Journal of Botany. Trevelyan, Sir W. C., Bart.; Brazil (39).

AUSTRALIA.—Moore, Chas.; specimens belonging to the collection of timbers exhibited at Philadelphia. Mueller, Baron von; various Australian plants (470). Trevelyan, Sir W. C., Bart.; Australian plants (92).

AUSTRALASIA.—Hector, Dr.; New Zealand (55). Potts, T. H.; New Zealand (7). Schomburgk, Dr.; New Caledonia (10). Whitmee, Rev. S. J.; Samoa (274); the further novelties amongst the Ferns are described by Mr. Baker, Journal of Botany, 1876, pp. 342-345.

(*From the* "Report on the Progress and Condition of the Royal Gardens at Kew, during the Year 1876.")

RECENT RESEARCHES ON THE ENTOMOPHTHOREÆ.

Ueber die Entomophthoreen und ihre Verwandten. Von DR. OSCAR BREFELD. (Botanische Zeitung, June, 1877.) *Die copulation bei einigen Entomophthoreen.* Von DR. LEON NOWAKOWSKY. (Botanische Zeitung, April, 1877.)

THE question as to the sexuality or asexuality of some groups of fungi is, in these two memoirs, shifted from the *Basidio-* and *Ascomycetes*, to which it has recently been confined, to a group much lower in the scale. The first-named author who, as is well known, has given considerable attention to the study of *Entomophthora* (better known in this country as *Empusa*), has come to the legitimate conclusion that, as all observation has failed to discover the resting-spores of *E. muscæ* in the bodies of flies, those spores must be developed in some other host. His paper, however, does not fill up the gap in the life-history of the above-named fungus, but deals mainly with its congener *E. radicans* found on the cabbage caterpillar in autumn. Nearly two years ago the resting-spores of (as was supposed) this species were found in small quantity inside the caterpillars, but these spores did not germinate in the following spring. Last autumn the fungus was

found in great abundance; and as germination in the spring did not succeed, another method, that of inoculation, was followed in order to show if the resting-spores were indeed genetically connected with the mycelium and ordinary spores of the caterpillar-pest For each series of inoculations 120 caterpillars were chosen; of these 100 were inoculated with fresh ordinary spores, while the rest were placed aside for a control-experiment. Of the first 100 inoculated, 81 showed the disease, and 19 were rendered useless either by their passing into the pupa state, or by their being attacked by animal parasites; 62 of the above 81 showed normal eruption of the fungus, and 19 only slight signs of its presence. The dry shrivelled bodies were found filled with resting-spores. In the second experiment, the caterpillars here being inoculated with spores from the first series, 50 were attacked (as evinced by eruption), and 28 dried up. Of the third series, inoculated with spores from the preceding, 39 showed eruption of the fungus, and 38 dried up; 54 of the fourth series became shrivelled and 29 had the eruption. Of the fifth series only 14 showed eruption; and in the sixth all dried up. All the uninoculated caterpillars remained sound.

Dr. Brefeld holds that these resting-spores arise asexually; by means of them, of course, the fungus passes through the winter. He refers to the resting state of *E. radicans* Fresenius' *E. sphærosperma*; moreover, the genus *Tarichium* of Cohn must disappear altogether; indeed he thinks it possible that *Tarichium megaspermum*, Cohn, may be the resting-spore-bearing state of *Empusa muscæ*. In addition a further conclusion is stated which must eventually either stand or fall with the accepted asexuality or sexuality of the higher Fungi. It is this; that in all essentials the structure and development of the *Entomophthoreæ* correspond to the same of the lower *Basidiomycetes*, such as *Exobasidium* and *Tremellineæ*, except that the Entomophthoreous basidium is one-spored; but we certainly think it unwarrantable to adduce the occurrence of these presumed asexually-produced resting-spores as an additional proof of asexuality of *Basidiomycetes*. Indeed Nowakowsky's conclusion is a directly opposite one, for he asserts that he has seen zygospores not only in *E. radicans*, but also in two new species (*E. curvispora* and *E. ovispora*). These zygospores are produced in the manner that Brefeld himself discovered in the case of *Piptocephalis*, viz., as an excrescence from one of the lateral outgrowths of two conjugating cells. Nowakowsky, moreover, arranges the *Entomophthoreæ* as a special group of *Zygomycetes* near *Piptocephalideæ*. Nothing daunted, however, Brefeld holds to his original opinion, and considers that what Nowakowsky takes for conjugation is a simple fusion of hypha-threads, and has nothing to do with formation of resting-spores. Assuming, therefore, that all *Basidiomycetes* (in the Brefeldian sense) are reproduced asexually, we see starting from *Entomophthoreæ* gradual elimination of the resting-spore element accompanied by complication of the ordinary fruit. The *Ustilagineæ* also come into the series, only here instead of the resting-spores being merely *one* form of reproductive organ, they are *the main* form, since reproduction by gonidia and by ordinary spores occur only on germination of the resting-spores. With regard to the *Uredineæ*, the *Æcidium* fruit is held to be the analogue of the resting-

spores of *Entomophthoreæ* and *Ustilagineæ*, the spermogonia corresponding to the gonidia of the former, and to the club-shaped sexual cells of *Tremellineæ*, while the teleutospore-fruit is a true basidiomycetous fruit, the teleutospore being merely the expression of adaptation to external conditions and producing true basidiospores as the result of its germination.

Dr. Brefeld agrees with Sachs in considering that the *Zygomycetes* and *Oosporeæ* have been derived from Algæ. For them he adopts the old word *Phycomycetes*. The rest of the Fungi are divided into two groups, *Myxomycetes* and *Mycomycetes*, the latter containing *Basidiomycetes*, *Ustilagineæ*, *Æcidiomycetes* and *Ascomycetes*. S. M.

Movements of Ceratophyllum.

M. E. Rodier has been studying ("Comptes Rendus," 30th April, 1877) *Ceratophyllum demersum*, and finds that it executes spontaneous and regular movements of a very definite character. The stems are usually erect, or nearly so, in the water, and it is in the upper part that the movements occur; these consist of a regular bending and straightening again, combined with a more or less pronounced torsion. The maximum of flexion is reached in about six hours, the recovery is slower, and in twelve hours the erect position is regained, flexion in the contrary direction then occurs and reaches its maximum in about four hours, then the restraightening recurs, and in about another four hours the original position is again reached; thus the whole duration of a revolution is about twenty-six hours. The movement of flexion commences in the upper internodes and passes from above downwards; on the contrary the straightening begins below and terminates at the top. Light appeared to exercise no influence on these movements. The torsion-movement, which is very evident, is still a subject of investigation.

H. T.

Notices of Books.

Kryptogamen-Flora von Schlesien. Herausgegeben von Prof. Dr. Ferdinand Cohn. Breslau: J. V. Kern's Verlag.

The two parts forming the first volume of the Silesian Cryptogamic Flora have now appeared. They contain the vascular Cryptogams from the pen of Dr. K. Gustav Stenzel, the Mosses and *Hepaticæ* by K. Gustav Limpricht, and the *Characeæ* by the late Professor Alexander Braun, of Berlin. The vascular Cryptogams and Mosses have been treated most carefully and exhaustively by Drs. Stenzel and Limpricht, whose work is the result of long research in that particular province. Each species is fully described, its station or stations named, and the nature of its habitat and season of appearance carefully noted, while a general introduction places before us the prominent features of the geographical distribution. But of the work on *Characeæ* which Prof. Braun presents to us we cannot speak without admiration. It includes not only the *Characeæ* of Silesia, but those of

all Germany,* and the descriptions coming from so great an authority on this particular group, possess an additional value from the non-existence of a complete monograph. The introduction deals with the geographical distribution, &c., and a classical account of the morphology is added. The following table illustrates the systematic arrangement employed by Prof. Braun in this work.

Systematic Review
of the Families, Genera, and Species of the Characeæ.

I Family : NITELLÆ.

1. NITELLA.

A. *Monarthrodactylæ* (*furcatæ*).

a. dicœcæ.

α. glœocarpæ. — 1. *N. syncarpa.* 2. *N. capitata.*

β. gymnocarpæ. — 3. *N. opaca.*

b. monœcæ.

gymnocarpæ. — 4. *N. flexilis.*

B. *Diarthrodactylæ* (*flabellatæ*).

monœcæ.

α. gymnocarpæ. — 5. *N. mucronata.* * *N. flabellata.* 6. *N. gracilis.* 7. *N. tenuissima.* (*N. batrachosperma.*)

β. glœocarpæ.

2. TOLYPELLA.

omnes monœçæ. — (*T. prolifera.*) 8. *T. intricata.*

II Family : CHAREÆ.

3. LYCHNOTHAMNUS.

species monœca. — (*L. barbatus.*)

4. CHARA.

A. *Astephanæ* (*ecorticatæ*).

species dicœca. — 9. *Ch. stelligera.*

B. *Haplostephanæ.*

a. ecorticatæ.

monœcæ. — (*Ch. coronata.*)

b. gymnophyllæ.

monœcæ. — (*Ch. scoparia.*)

C. *Diplostephanæ* (*corticatæ.*)

a. isostichæ,

sp. dicœca. — (*Ch. crinita.*)

b. diplostichæ.

α. tylacanthæ.

† dicœcæ. — (*Ch. ceratophylla.*)

†† monœcæ. — 10. *Ch. contraria.* (*Ch. jubata.*) (*Ch. intermedia.*)

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* In the table the species not yet known to occur in Silesia are enclosed in brackets.

β. aulacanthæ.
monœcæ. 11. *Ch fœtida.*
* *Ch. subhispida.*
12. *Ch. hispida.*
(*Ch. rudis.*)

γ. triplostichæ.
† dicœcæ. 13. *Ch. aspera.*
(*Ch. tenuispina.*)
†† monœcæ. 14. *Ch. fragilis.*
(* *Ch. delicatula.*)

It will be seen that the *Characeæ* are divided into two sub-families, *Nitelleæ* (with the genera *Nitella* and *Tolypella*) and *Chareæ* (with the genera *Lychnothammus* and *Chara*). How far the formation of these sub-families (by von Leonhardi and adopted by Wahlstedt) can be justified Professor Braun declines to discuss but he expects that morphological peculiarities will show that the genera *Tolypella* and *Lychnothammus* rest on a secure basis. This was the last work of Professor Braun, finished just before his death, and it forms an invaluable summing up of the researches on this subject of himself, of his contemporaries, and a younger generation of botanists who listened to his teaching.

The second volume, containing the *Algæ* and *Lichenes*, is already in the press; and the third, containing the *Fungi*, is in preparation. The work is dedicated to Professor Goeppert. G. M.

Beiträge zur Biologie der Holzgewächse. Von Dr. F. W. C. Areschoug. With 8 quarto plates. (*Extracted from the* "Lunds Universitets Arsskrift," vol. xii., 1877.)

This work contains a careful and copiously illustrated account of many years' observation on the branching of the under-mentioned species:—*Ulmus montana*, Sm., *Daphne Mezereum*, L., *Salix alba*, L., *Alnus incana*, DC., *Prunus Padus*, L., *Prunus Avium*, L., *Prunus japonicus*, Thbg., *Amygdalus nana*, L., *Larix europæa*, DC., *Betula verrucosa*, Ehrh., *Berberis vulgaris*, L., *Cornus mas*, L., *Acer platanoides*, L., *Pyrus Malus*, L., *Pyrus elæagnifolius*, Pall., *Pyrus Aucuparia* (L.), *Pyrus scandica* (Fr.), *Cratægus oxyacantha*, L., *Ribes grossularia*, L., *Rhamnus infecteria*, L., and *Rhamnus cathartica*, L. S. M.

Malesia, raccolta di osservazioni botaniche intorno alle piante dell arcipelago Indo-Malese e Papuano pubblicata da Odoardo Beccari Vol. I. (Genoa, 1877, 4to, pp. 96, tab. 2).

The object of this new publication is to make known the botanical result of the author's long and successful explorations in the Indo-Malayan Archipelago and New Guinea, extending from 1865 to 1876, not only by technical description, but by collateral observations and researches.

This first part contains the Palms of New Guinea (including notes on species of neighbouring countries), for which grand Family the author has a special liking. He gives first a short introduction, with an account of their fecundation, geographical distribution, &c., and

then goes on to the systematic portion. He describes 50 species under 19 genera, usually with great fulness of detail. The new species are very numerous, no less than 32, and 2 new genera are founded, *Nengella* with 2 species, and *Sommiera* also with 2 species; the latter genus commemorates the Secretary of the Botanical Congress held in Florence in 1874. There are also critical notes on other species from neighbouring countries, and under *Metroxylon* we have an account of the production of Sago. Each of the new genera is illustrated by a plate. H. T.

Proceedings of Societies.

LINNEAN SOCIETY, *April 5th.*—G. J. Allman, F.R.S., President, in the chair.—Capt. Chimmo, R.N., Rev. J. Constable, and Prof. Liversedge were elected Fellows.—Sir C. Strickland exhibited a specimen of *Crinum aquaticum* in flower, a native of Grahamstown, Cape Colony. The following papers were read: "On a collection of Ferns made by Miss Gilpin in the interior of Madagascar," by J. G. Baker. This was supplementary to the account of Mr. Pool's gatherings described last year. The remarkable richness of the Fern Flora of Madagascar is further exhibited by this additional collection, in which there are seventeen new species, though all of familiar types.—J. Reinsch, "On the Fresh-water Algæ of the Cape of Good Hope."—W. Mitten, "On South African *Hepaticæ*."—W. A. Leighton, "On two new Irish Lichens."

April 19th.—G. Bentham, F.R.S., Vice-President, in the chair.—Mr. R. J. Lynch made some observations on the disarticulation of branches and exhibited specimens. In some species of *Phyllanthus* the phylloid branches fall precisely like leaves, and have in their axils buds from which the permanent branches are produced. In *Castilloa* the lateral branches become detached by a regular disarticulation from below upwards just as in leaves.—M. Casimir De Candolle read a paper "On the geographical distribution of the *Meliaceæ*." Considering that new species and new stations of known forms may yet be discovered in this exotic group, precise delineation of specific areas must be regarded as merely tentative, though there is reason to believe that few new genera are likely to be admitted by botanists. M. Jussieu, in his monograph of *Meliaceæ* and *Cedrelaceæ*, in 1830, had 135 species and 34 genera to deal with; at present 560 species and 35 genera are known. Saving *Eleutheria*, South America has yielded no new genus since Jussieu's time. The *Meliaceæ* inhabit almost exclusively regions situated between the tropics. In a synoptical table the author exhibited the number of species of each genus in all the countries where *Meliaceæ* are known to exist, and by the aid of a coloured map showed the areas occupied. His general conclusions may thus be summarised: 1. The number and the mutual affinities of the various genera of *Meliaceæ* decrease from the Asiatic region towards Africa and America on one side and towards East Polynesia on the

other. 2. Between the *Meliaceæ* of America and Africa there exists analogy, whilst Polynesian species belong to Indian type. 2. New Caledonia contains within itself a remarkable number of distinct species, the type of which, however, is Indian. 4. In Australia three Indian genera are found, along with three genera exclusively belonging to Australia. 5. No *Meliaceæ* have hitherto been collected in the most eastern islands of Polynesia; if subsequent observations reveal such, it will be interesting to know whether they pertain to Indian or American types.

May 3rd.—G. J. Allman, F R.S., President, in the chair.—Mr. J. Paton was elected a Fellow, and Prof. Carl Gegenbaur, Prof. Rudolf Leuckart, and M. Pierre Duchartre were elected foreign members.—Mr. A. W. Bennett exhibited and commented on some abnormal Primroses.—Mr. G. S. Boulger made a communication on *Thlaspi perfoliatum*. In addition to the counties of Oxford and Wilts, the limited area of this species extends also into Gloucestershire; yet it is rather a plant of the Thames basin than the Severn valley.

June 7th.—G. J. Allman, F.R.S., President, in the chair.—The following papers were read: "On some points in the morphology of the *Primulaceæ*," by Dr. Maxwell Masters. The author stated there had been much discussion about the superposition of the stamens to the petals, the free central placenta, and the nature of the ovules in the *Primulaceæ*. Arguments and references based thereon have been derived from the comparative morphology of the genera of the order and of allies, the mode of development of parts of flowers, the minute anatomy and distribution of vascular bundles within the flower, and teratological phenomena. From a lengthened study and comparison chiefly of the phenomena of monstrosities, the author arrives at conclusions differing somewhat from those hitherto published. Cultivation, he believes, is not the reason of the frequent structural variation, for deformed *Primulaceæ* in the wild state are far from uncommon; indeed, the wild Primrose itself is very much subject to such changes. Certain genera and species are more frequently found deformed than others; for instance, the Cowslip is less subject to change than the Primrose. Entering into all the more important variations observed by the author, and recorded by others, in various parts of the flower, he sums up: 1. The petals of most *Primulaceæ* are late outgrowths from the receptacular tube. 2. The placenta is a direct prolongation of the receptacle or axis, and without apical or side connection with the carpels. 3. The placenta occasionally in monstrous flowers arises from the margin or centre of the carpel, but sometimes is detached, the detached placentæ cohering like a solid column. 4. Staminal and carpellary leaves may occasionally be divided or lobed. 5. The ovular coat is essentially foliar, representing a blade or undivided leaf, and is not a direct production from the axis. 6. Processes of carpellary leaves may be infolded, thus forming secondary carpels.—"Note on the causes of numerical increase of parts of plants," by Rev. G. Henslow. The author classified the various methods and causes of the increase of parts of leaves and floral whorls, more especially with the view of limiting each of the various kinds to its proper cause respectively.—"On the floral development and symmetry in the Order *Sapotaceæ*," by M. M. Hartog. The observations here recorded are

based on dissections of the buds in all stages of some species of the genera *Bassia*, *Dasyaulus*, *Achras*, *Mimusops*, and *Chrysophyllum*. From the extracts read of this somewhat technical communication, it appears the author, from observation of the growing plants in Ceylon, has independently brought forward evidence tending in certain respects to the same results as those propounded in the two foregoing papers.—"On the Lichens obtained during the voyage of H.M.S. *Challenger*," by Rev. J. M. Crombie. A useful feature in this paper is a terminal conspectus giving the general results in small compass, and therefore handy for consultation.

June 21*st*.—The Rev. G. Henslow, M.A., F.L.S., in the chair.—John Macdonald, M.D., was elected a Fellow.—Dr. R. Braithwaite exhibited a fine example of the inflorescence of *Chamærops Fortunei*, obtained from a tree planted by the late Dr. Harvey at Clapham Rise, noteworthy from its being the fifth successive year of flowering in this country in the open air, and without any protection against the winter season.—The following papers were read: "The Fungi of the counties of Dublin and Wicklow," by Mr. Greenwood Pim. With the exception of a list compiled by Dr. Power in 1845 of the Fungi of the county of Cork, it seems this section of the Irish Flora hitherto has received very little attention. — "On *Mycoidea parasitica*, a new genus of Parasitic Algæ, and the part which it plays in the formation of certain Lichens," by Dr Douglas Cunningham. After several years' patient watching the author believes he has obtained a consistent narrative of the life-history of this plant. Specimens have been at intervals noticed on the leaves of the Mango-tree, Rhododendrons, Ferns, Crotons, the Tea and other plants, so that it cannot be altogether rare; indeed, in one instance they created quite a destructive blight on *Camellia japonica* in Calcutta. Leaves affected with the *Mycoidea* are margin-eaten, perforated or spotted with circular pustules and discs of a greenish or orange colour; and the existence of a firm coriaceous texture and thickened epidermal coating is a common feature. The author enters fully into the anatomical characters and other peculiarities of the plant. He regards it as having close relation to *Coleochæte*, with departures, however, from that type adapted to its parasitic habit, &c. In conclusion he calls attention to the Rev. Mr. Berkeley's paper on the "Thread Blight of Tea," and the observations of Archer and others, as to some extent corroborating his own recent researches. Specimens and beautifully-coloured sketches illustrated the paper.—Mr R. Irwin Lynch exhibited a growing specimen of the Blimbing (*Averrhoa Bilimbi*, L.) from Kew, to illustrate a note of his with regard to the automatic movement of its leaves. Irrespective of the phenomena of its sleep, he has observed that one or more of the leaf pinnæ will suddenly drop down and only rise slowly and almost imperceptibly after a few minutes or even a considerable interval of time has elapsed. Irritation of the under surface of the leaflets is not usually effective in producing this movement, but the upper surface appears more sensitive to touch.—"Notes on the peculiarities and distribution of *Rubiaceæ* in Tropical Africa," by W. P. Hiern. From his researches it appears that on comparing the number of species with those belonging to other large Natural Orders of Tropical Africa, it is the second largest Order of flowering plants of

that region, being rather more numerous in species than *Compositæ*, and exceeded only by *Leguminosæ*. While there are about 500 species or more already known from Tropical Africa (and much of the country a *terra incognita*), other large or considerable or isolated regions yield —Cape of Good Hope over 100, Spain about 80, Britain under 20, Europe 171, Hindostan about 160, British India 600, Dutch India 500, Australia 110, New Zealand 31, British West Indies above 170, and Brazil about 1000. Doubtless as mid-Africa is opened up the proportions of its Rubiaceous plants will be greatly increased.

Botanical News.

Articles in Journals.—June.

Grevillea.—M. C. Cooke, "Orange Mould on fruit-trees."—Id., "North American Fungi."—Id., "*Erisiphe graminis*."

Bull. Soc. Bot. France (vol. xxiv., pt. 1).—P. Petit, "List of *Desmidieæ* observed in environs of Paris."—B. Verlot, "Plants in flower on 12th January in the garden of the Museum, Paris."—H. Vilmorin, "Plants in flower at Verriere, near Paris, on 7th January."—M. Cornu, "Note on collection of some hypogæal Fungi."—P. E. Du balen, "Extension of plants recently appeared in the S.W. of France."—M. d'Arbaumont, "On stomata and lenticels of *Cissus quinquefolia*" (tab. 2, 3).—Cauvet, "On the Pomegranate root-bark of commerce."—J. Poisson, "On two fly-catching plants" (*Mentzelia*, *Gronovia*).—P. Petit, "List of Diatoms observed in environs of Paris" (tab. i.).—V. Payot, "Two cases of fructification of Mosses beneath snow."—Guitteau, "Additions to flora of Vienne."—E. Fries, "Commentarius in cel. L. Queletii dissert.: 'Sur la class. et nomenclat. des Hymeniées' in Bull. Soc. Bot. 1876 insertam."—L. Quelet, "Remarks on the foregoing."—P. Duchartre, "On the axillary buds of *Begonia*."—Van Tieghem, "On the development of some Ascomycetes (*Aspergillus* and *Sterigmatocystis*).—E. Mer, "Researches on the causes of colouration of leaves in autumn and winter."—Id., "On influence of parasitic Fungi on production of starch in leaves."—E. Bonnet, "On the French species of *Ephedra*."—P. van Tieghem, "On *Bacillus amylobacter* and its part in putrefaction of vegetable tissues."—A. Beketoff, "On some monstrosities in *Cichorium Intybus*."—J. Duval-Jouve, "Histological study of the cladodes of *Ruscus aculeatus*."

Oesterr. Bot. Zeitschr.—F. Hauck, "Algæ of the Adriatic" (contd.).—V. de Borbas, "*Inula adriatica* (subhirta × squarrosa)."—J. Dedecek, "Bryology of Turnau."—W. Vatke, "Plantæ in itin. Afric. ab Hildebrandt collect." *Compositæ* (contd.).—A. Kerner, "Distribution of Hungarian plants" (contd.).—J. Wiesbaur, "*Ophioglossum vulgatum* in Hungary."—"Signor d'Albertis' explorations in New Guinea."—F. Antoine, "Botany at Vienna Exhibition" (contd.).

Bot. Zeitung.—O. Brefeld, "On the *Entomophthoreæ* and their allies."—G. Haberlandt, "On the origin of chlorophyll-grains in the cotyledons of *Phaseolus vulgaris*."—Schenk, "On the structural con-

dition of fossil plants."—Id., "On structure of the fruit of *Compositæ* and *Labiatæ*."

Flora.—E. Pfitzer, "On structure and development of parasitic Orchids."—M. Gandoger, "Rosæ novæ Galliam austro-orient. colentes" (contd.).—C. Kraus, "Causes of growth-direction in non-vertical shoots."—S. Schulzer, "Mycological notes."—O. Drude, "*Agrostis tarda*, n.sp., native of the Alps."—F. Arnold, "Lichenological fragments."

Hedwigia.—N. Sorokin, "Note on two new microscopical Fungi, *Prophytroma tubularis* and *Saccopodium gracile*" (c. tab.).

Magyar Növénytanilapok.—C. Mika, "On the morphology and microchemical reactions of Hesperidin."

Bull. Bot. Soc. Belg. (xv., part 3, June 20th).—A. Hardy, "Report of Herborization, 1876."—E. Fournier, "On Mexican Grasses with separate sexes" (*Jouvea*, gen. nov.).—A. de Candolle and A. Cogniaux, "Some points of botanical nomenclature" [see p. 189].—A. Godron, "Note on *Rosa glauca*, Vill."—A. Déséglise, "Enumeration of species of *Rosa* of Europe, Asia, and Africa, especially those of France and England" (contd.).—O. Hecking, "Note on *Viola lancifolia*, Thore."

New Books.—J. G. Baker, Flora of Mauritius and the Seychelles (Lovell Reeve, 20s.).—E. C. De Crespigny, "A new London Flora" (Hardwicke and Bogue, 5s.).—J. Smith, "Ferns, British and Foreign," new and enlarged edition (Hardwicke and Bogue).—F. W. Burbidge, "Horticulture" (Series of "British Industries." Stanford, 3s. 6d.)—O. Beccari "Malesia," vol. i., fasc. 1 (Geneva, 12 lire).—Barton and Castle, "The British Flora Medica," new edition, edited by J. R. Jackson (Chatto and Windus, 30s.).—L. Just, "Botanischer Jahresbericht, 1875, Part 2" (Berlin).—C. Darwin, "Different Forms of Flowers on Plants of the same Species" (Murray, 10s. 6d.).—Franchet and Savatier "Enumeratio Plantarum in Japonia sponte crescentium," vol. ii., part 1 (Paris, Savy, 16 fr.).—W. O. Focke, "Synopsis Ruborum Germaniæ" (Bremen, 7mk.)—Pritzel, "Thesaurus Literaturæ Botanicœ," ed. 2. Parts 5-7 (Leipzig, 27mk.)

The "Acta Horti Petropolitani," tom. iv., contains papers by Glehn on the plants collected in Nitim-Okema Land by Polkajov and Maydell; by Trautvetter on those collected in America by Radde, and in Daghestan by Becker; and Regel continues his descriptions of new and little-known plants.

In the volume of Pringsheim's "Jahrbucher" for 1877, we find memoirs on the movement of water in plants by E. Pfitzer; on the development of the seeds of *Orobanche* (with three plates) by L. Koch; on the development of *Phyllitis*, *Scytosiphon*, and *Asperococcus* (with three plates), and on the sexual reproduction of *Bangia fusco-purpurea* by J. Reinke; and an account of new *Saprolegnieæ*, of parasites in the cells of Desmids, and of certain spiny cells in *Achlya*-cells, by P. F. Reinsch.

The "Bericht" of the Botanical section of the Silesian Society for 1876 contains many communications of interest. Prof. Cohn gives,

amongst others, accounts of his experiments on spontaneous generation, on insectivorous plants, and on Rust Fungi observed on grain in Silesia, and also recounts some botanical observations made in England and Scotland during his visit here last year. Prof. Goeppert has papers on so-called carnivorous plants, and on metamorphosis, and there are communications by Eidam on *Sphærotilus natans*, by Limpricht on the Silesian Moss-Flora, and by Von Uechtritz on the Phanerogams of the same country with special reference to critical species.

The Dorset Natural History and Antiquarian Field Club has issued the first part of its "Proceedings," edited by Prof. Buckman. The botanical papers consist of notes by Mr. E. Lees on the Maples in Sherborne Park, and on *Sparassis crispa*, and a note on Dog Violets by the excellent President of the Society, Mr. Mansel-Pleydell, whose portrait forms a frontispiece to the volume.

Under the title of "Fossil Plants, and their testimony in reference to the doctrine of evolution," Mr. Carruthers has reprinted his two anniversary addresses delivered as President of the Geologists' Association in 1875, 1876. The first gives an account of the conditions under which vegetables have become fossil, and traces the various groups of plants upwards through the series of rocks; the second deals with the hypothetical phylogenesis of the vegetable kingdom as given by Haeckel and others, and compares it with the actual known facts of palæontology. The author concludes that though the latter testify to a progression from lower to higher types, they are completely opposed to the hypothesis of genetic evolution.

Mr. G. S. Boulger has communicated to the annual meeting of the Cotteswold Naturalists' Field Club some "Preliminary notes to a proposed Flora of Gloucestershire." The accompanying map shows the county divided into twelve districts on the hydrographical system now generally followed in county floras, and these are described in the text, which also contains notes on some of the more interesting species, wants, &c.

An important history of the literature of *Hepaticæ* has been published by Dr. S. O. Lindberg, comprehending all writers from the earliest times up to the death of Linnæus. The 'Lichen" of Theophrastus and Pliny was *Marchantia polymorpha*, but after their time there were no additions to the published names till Columna in 1616 noted three more species. Dillenius and Micheli are the great contributors of ante-Linnean descriptions, and all the modern determinations of their species are given. The paper is written in Swedish.

Dr. Berggren has published in the "Handlingar" of the Royal Swedish Academy (Bd. 13., No. 7 & 8) a complete account of the Musci and Hepaticæ of Spitzbergen and Bear Island collected in the Swedish Expedition of 1864 and 1868, and of the Moss-Flora of Disco Bay and Aulertsivikfjord in Greenland.

Sir Joseph Hooker is visiting Prof. Asa Gray in the United States of America. The "Athenæum" states that he intends to make a botanical tour through Colorado.

The death is announced of Dr. Gustav Waldemar Focke at Bremen, on June 1st, in his sixty-eighth year. He was well known for his researches in *Desmideæ* and Diatoms.

Original Articles.

LAVATERA SYLVESTRIS, *Brot.*, IN BRITAIN.

By Henry Trimen, M.B., F.L.S.

(Tab. 191.)

In the January number of this Journal (p. 16) will be found a note recording the occurrence of *Lavatera sylvestris*, Brot, in the Scilly Isles, where it was gathered by Mr. Curnow. We are indebted to the same botanist for fresh specimens of the plant collected this season, and from them the following description and figure have been made :—

Lavatera sylvestris, *Brotero*, *Fl. Lusit* ii., p. 277 (1804). Herbaceous, biennial or annual, more or less erect or rarely prostrate. with elongated, slender, tough, cylindrical, pale green branches, hispid with small raised papillæ crowned with short rigid stellately-spreading hairs. Leaves on similarly hispid cylindrical petioles which exceed them in length, roundish, more or less cordate at the base, the lower ones two inches or more wide, the upper much smaller, divided into five shallow lobes which are obtuse and nearly equal in the lower leaves, acute and the basal ones much the smaller in the upper leaves, coarsely crenate-dentate, pubescent on both surfaces, rather paler beneath ; stipules broadly triangular (narrower in the upper leaves), acute, thin, hairy externally, ultimately reflexed. *Flowers* usually in clusters of 3-6 in the leaf-axils (or on short branches from the same points) on short hairy erect pedicels much shorter than the petioles ; epicalyx cup-shaped, divided $\frac{2}{3}$ down into three broadly-ovate subacute erect-spreading hairy segments. *Calyx-segments*, triangular-acuminate, hairy externally, denticulate-ciliate, with tufts of hair at the margin. *Petals* about thrice as long as calyx, narrow, notched or shallowly bilobed at the apex, pale rose-purple. *Fruit* small, about $\frac{3}{8}$-inch wide, the cocci quite smooth, rounded on the back, and entire at the edges, almost completely covered by the considerably enlarged calyx-segments, which are connivent in a reduplicate valvate manner over it, their points meeting in the centre and erect ; the epicalyx also becomes enlarged and spreads widely.

It will be seen from the above description , and from the accompanying figure, that this species has a close first-sight resemblance to *Malva sylvestris*, L., the common mallow. The points of difference—besides that of the epicalyx—upon which the distinctive generic character is founded—are its annual or biennial habit, paler and greyish-green colour and stellate hairiness, the more acute stipules, the rather smaller and bluer flowers, the fewer carpels which are perfectly smooth and unwrinkled on the back, and the more enlarged fruiting calyx and epicalyx. There can, with a little care, be no chance of confounding the two species.

The localities where *L. sylvestris* has been collected in England

are the islands of S. Mary, S. Agnes, and Tresco, in the Scilly group, and near Penzance on the mainland of Cornwall It was first observed in the first-named island (as previously recorded), in July, 1873, by Mr. Curnow, in company with Mr. Ralfs and Mr. Tellam, and again in abundance near Hugh Town last year, 1876. This summer Mr. Curnow states that it is far less plentiful here, but is found to be abundant in S. Agnes and Tresco islands. In the former of these it occurs in large quantities at Higher Town farmyards, a place a "considerable distance inland"; and in the latter, near New Grimsby, it is a very abundant and troublesome weed, being found in meadows, on dung-heaps, and waste ground, extending more than half a mile into the country lanes; in one place it covers 300 yards or more in extent, mixed with, but in far greater quantity than both *Lavatera arborea* and *Malva sylvestris*.

On the Cornish coast a few plants only have been seen by Mr. Tellam and Mr. F. J. Hanbury near Penzance. With regard to the claims of the plant to be native in these stations, I should wish to speak with the reserve proper to one who has not examined the localities, but, so far as I am able to judge from the above facts. I think that the probability of recent introduction is very strong. The discoverer, however, and other Cornish botanists who have visited Scilly, are perfectly satisfied that the plant is native there, so that it is proper to give the considerations which seem to weigh against this opinion.

One of our most careful observers, Mr. Townsend, who examined the Flora of the Scilly Islands in 1863, did not find *L. sylvestris*. The results of his investigations were given in the volume of this Journal for 1864, and show how well he worked the islands botanically. Though he has recently said (see p. 56) that it is quite possible he might have overlooked this species, he surely would not have done so had it then occurred in any quantity. The present extreme abundance of the plant as described by Mr. Curnow, indeed, goes strongly against its nativity in the islands, and much more suggests the rapid spread of a recent introduction. I am informed by Messrs. T. R. A. Briggs and F. J. Hanbury, that in the locality at S. Mary's, where they collected it during this year, it grows on the shore almost in the town and in company with a very suspicious plant, *Reseda fruticulosa*; they thought it clearly an introduction in that spot.

The occurrence of the plant on the Cornish coast is also important in relation to the question. There can be scarcely two opinions as to its *status* here; three plants were seen by Mr. Tellam near the siding of the railway at Penzance; and two plants were found by Mr. Hanbury by the roadside between that town and Marazion, growing with other evident introductions. It would thus appear that it is attempting to gain a footing on the mainland as it has already done on the Scilly Isles.

The exotic range of *L. sylvestris*, however, is not altogether opposed to the notion of its occurrence on our western shores. Its head-quarters seem to be Portugal, where it is a very frequent plant, as also in adjacent parts of Spain; it is exceedingly common in Madeira, and occurs also in all the Azores, in the Canary Islands, and on the African coast at Mogador. From western France, including

Tab. 192.

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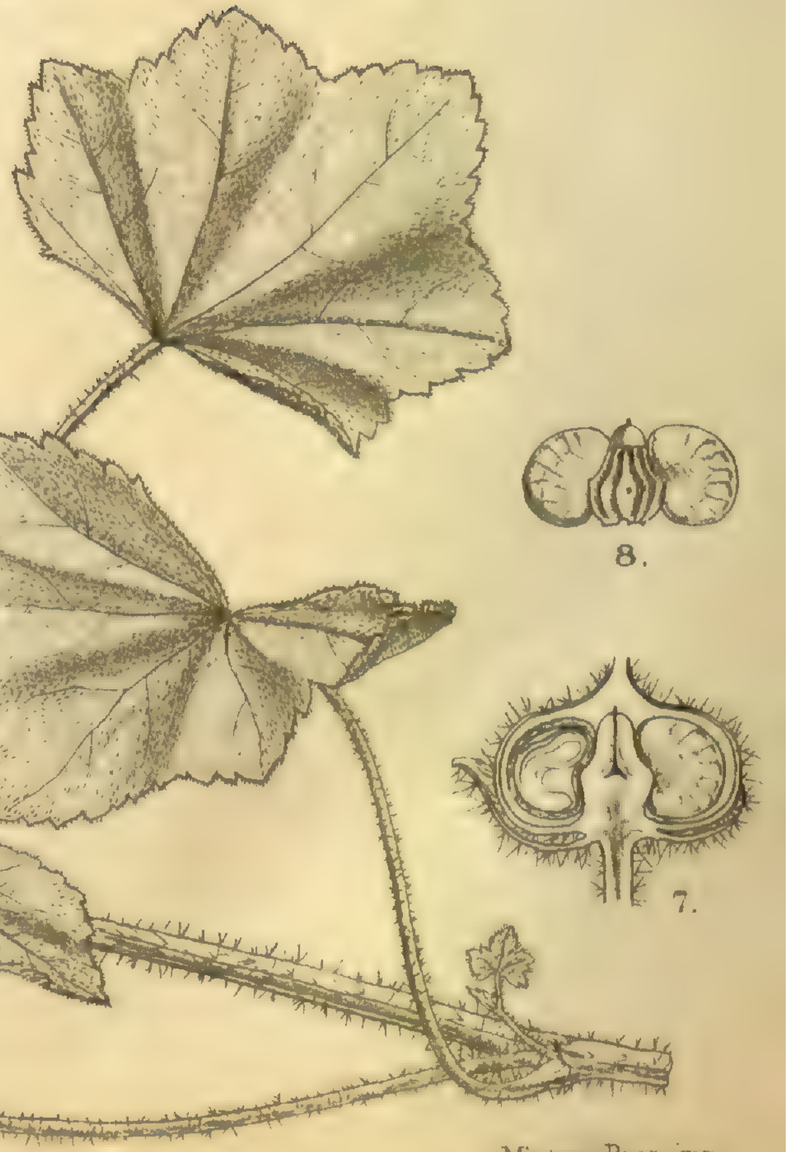

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7.

D Blair F.L.S del. et lith.

Mintern Bros. imp.

Lavatera sylvestris, *Brot.*

the Channel Islands, the species does not seem to have been recorded, nor does it occur in Ireland. Under all the circumstances it appears to be more reasonable to suppose it imported into Scilly with ballast or merchandise than to consider that group of islands an outlying native station.

The question of distribution is somewhat complicated by that of the relationship of *L. sylvestris* to *L. cretica*, L., with which the French botanists unite it. The latter is a larger and much more hairy plant, with the carpels densely pilose or felted, and is found on the Mediterranean shores of France, Italy, Syria, Egypt, and Algeria, and the islands of Corsica, Sicily, Crete, &c. It is probably this latter which has been found on the coast of Western France at Belle Isle, Croisic, and Sables d'Olonne, and considered by Lloyd to have been introduced from the south. He does not mention whether the carpels are smooth or felted. The Rev. R. T. Lowe considers the two species quite distinct, but states that the *L. cretica* of Cavanilles is smooth fruited and identical with *L. sylvestris*.

The section (*Anthema*) to which both *L. maritima* and *L. sylvestris* belong is quite artificially separated from *Malva*, to which indeed Webb, in the "Phytographia Canariensis," unites it. Lloyd, too, in the first edition of his "Flore de l'Ouest de la France," placed *L. cretica*, L., in the same genus under the name of *Malva mamillosa*.

The following are references to descriptions either of *L. sylvestris* or *L. cretica*, where further information may be obtained:—Brotero, Fl. Lusit. ii., p. 277, and Phytograph. Lusit. Select. ii., 225; DC. Prod. i., p. 440; Bertoloni, Fl. Ital. vii., p. 275; Gren. & Godr., Fl. France i., p. 292; Lloyd, Fl. de l'Ouest de la France, ed. 2, p. 106; Boissier, Fl. Orient, i., p. 882; Webb, Phytogr. Canar. i., p. 291 (*Malva pseudo-Lavatera*); Lowe, Man. Fl. Madeira. i., p. 64.

Description of Plate 191.

Representing *Lavatera sylvestris*, Brot., drawn from specimens collected by Mr. Curnow in the Scilly Isles. 1. A flower enlarged. 2. The epicalyx seen from below. 3. Fruit with calyx and epicalyx. 3. The same seen from above. 5. Side view; and 6. top view of fruit. 7. Section of the fruit, enlarged. 8. Fruit with some of the cocci removed to show the central column, enlarged.

ON THE BRASILIAN SPECIES OF *ALSTROMERIA*.

By J. G. Baker, F.L.S.

In the elaborate Monograph of the Brasilian species of *Alstromeria* in the third volume of the great "Flora Brasiliensis" of Martius and Eichler, the author, Prof. Schenk, has had an opportunity of consulting nearly all the continental, but not the British collections. Upon comparing it with these latter, I find that we possess at least five additional species, and that the British specimens throw further light upon the synonymy and relationship of some of the old ones. I propose, therefore, in the present paper to report upon the additional material which the British herbaria supply, giving a full list of the

known species, but not repeating anything which the Flora already contains.

The following is a key to the species, founded upon other characters than those which Dr. Schenk has used for this purpose:—

1. *Sylvestres.* Plants of shady woods, with membranous leaves, with slender veins.

Leaves of the flowering-stem small, sessile, linear or lanceolate.

1. *A. caryophyllea.* 2. *A. filipendula.* 3. *A. foliosa.*
4. *A. monticola.*

Leaves of the flowering-stem large, oblong-lanceolate, spathulate, petioled.

5. *A. inodora.* 6. *A. longistaminea.* 7. *A. pulchella.*
8. *A. scaberula.*

2. Plants of exposed places, with rigidly coriaceous or subcoriaceous leaves, with stouter veins.

Umbel simple	9. *A. plantaginea.*	10. *A. Isabellana*
	11. *A. cunea.*	12. *A. stenopetala.*
	13. *A. platyphylla.*	14. *A. Gardneri.*
Umbel compound	15. *A. Burchellii.*	16. *A. Sellowiana.*
	17. *A. brasiliensis.*	18. *A. longistyla.*
	19. *A. zamioides.*	

1. *A. caryophyllea*, Jacq.; *A. Ligtu*, Curt. in Bot. Mag., t. 125' non Linn., Rio Janeiro, *Gardner*, 844! *Mrs. Graham! Weir*, 439'

2. *A filipendula*, Schenk. Is this more than a form of the last?

3. *A. foliosa*, Mart.

4. *A. monticola*, Mart.

5. *A. inodora*, Herb. The typical form near Salta in Uraguay, *Tweedie!*; Buenos Ayres, *Fox!*; near Rio Janeiro. *Glaziou*, 6735!; and at an elevation of 5000-6000 feet on the Organ Mountains, *Gardner*, 5892! The plan roughly figured in the "Flora Fluminensis" (vol. iii., t. 121), under the name of *A. cunea*, looks to me more like this than the species to which Dr. Schenk has referred it. After carefully comparing the type specimens of the two, I can only regard *A. nemorosa*, Gardn. in Bot. Mag. t. 3958, which we have from woods on the Organ Mountains, *Gardner*, 698!, and gathered also by *Lobb* and *Weir*, 418!, as a shade-form of the same species.

6. *A. longistaminea*, Mart. Is this again really distinct from the last? I have not seen a type specimen.

7. *A. pulchella.* Linn. Suppl., 206; Kunth Enum. v., 781, *A. psittacina*, Lehm.; Kunth Enum. V. 759, *A. Banksiana*, Rœm.; Kunth Enum. v. 781, *A piauhyensis*, Gardn. MSS. I feel little doubt that the plant commonly grown in our gardens at the present day under the name of *psittacina* is identical with the *pulchella* of Linnæus, and that is a native of Brazil and not of Mexico, as Dr. Schenk supposes. Mexico is completely out of the geographical range of the genus, which is restricted to Chili, Peru, and the southern half of Brazil. There is a specimen from the Chelsea garden in the Banksian collection in the British Museum which will probably carry it back to 1780 as a garden plant in England, and it occurs also in the

Smithian herbarium under the name of *A. Ligtu*. Here also, doubtless, belongs the very indifferent wild specimen gathered near Rio by Sir Joseph Banks, which Solander referred to *pulchella*, and on which the name *Banksiana* was founded, and the plant distributed by Gardner as his No. 2324, under the manuscript name of *A. piauhyensis*, from sandy, shady woods near Oeiras seems to be also the same species. We have it in cultivation at Kew at the present time, but it is not nearly so effective as some of the Chilian species, especially *A. aurea* and *hæmantha*.

8. *A. scaberula*, Baker, n.sp. Flowering-stem 4-5 feet high, moderately stout, straight, glabrous, the upper 6 or 9 inches below the umbel destitute of leaves. Leaves 30-40, membranous, resupinate, bright green, and glabrous on the upper surface, glaucous and scaberulous beneath, with 5-9 distinct ribs, all erecto-patent, narrowed gradually to the base, not distinctly petioled, the lower ones 3-4 inches long, an inch broad at the middle, the upper ones linear and much smaller (1½-2 inches long, ¼-⅓ inch broad). Umbel of 4-5 simple rays 15-18 lines long, bracteated by 6-8 linear erecto-patent membranous leaves about an inch long. Perianth-limb erecto-patent, 15-16 lines long, all the segments oblanceolate-spathulate, acute, ¼-⅓ inch broad, the three lower rather shorter than the rest, the two upper inner longer than the top one, and conspicuously maculate with red-brown. Genitalia included; all the 6 anthers oblong, about a line long. Sterile stem not seen. Goyaz, in bushy places near the Mission of Douro, *Gardner*, 3473!

9. *A. plantaginea*, Mart. Goyaz near Arayas, *Gardner*, 4007!; Goyaz, in dry stony places on the Serra de Natividade, *Gardner*, 4008!; Goyaz, in bushy places near San Domingas, *Gardner*, 4367!; on the Caminho de Nené, near Goyaz city, *Burchell*, 6807!

10. *A Isabellana*, Herb. Rio Grande do Sul, *Isabelle! Tweedie*, 790! *Sello!* Campos of Itatiaia, *Glaziou*. 6734.

11. *A. cunea*, Schenk. To be compared with the last.

12. *A. stenopetala*, Schenk.

13. *A. platyphylla*, Baker, n.sp. Flowering-stem 3 feet or more long, stout, straight, glabrous, bearing only a few distant lanceolate, sessile, acute, rigidly coriaceous leaves about an inch long. Umbel of 6-8 simple erect rays 15-18 lines long, bracteated by 6-8 small linear leaves. Perianth-limb 18-21 lines long, narrowly funnel-shaped, the segments all oblanceolate-spathulate, acute, ¼-⅓ inch broad, the three lower shorter than the three upper, Genitalia included; anthers oblong, a line long. Barren stem bearing 30-40 leaves extending over a space of about a foot, which are oblong, narrowed to a short, twisted, winged petiole ¼ inch broad, the blade 3-4 inches long, 18-21 lines broad at the middle, subobtuse, rigidly coriaceous, green and glabrous on both sides, with a large number of unequally prominently raised ribs, a dozen or more on each side of the costa. Goyaz, at the Chapada at Nostra Senhora d'Abadia, *Gardner*, 4368!

14. *A. Gardneri*, Baker, n.sp. Flowering-stem about 3 feet long, glabrous, straight, rather slender, bearing only a few distant lanceolate, acute, rigidly coriaceous, glabrous, sessile leaves, under an inch long. Flowers 5-6 in an umbel, on simple pedicels a couple of inches long, bracteated by several lanceolate-acute leaves ½ inch long. Perianth-

limb funnel-shaped, 1½ inch long, the segments oblanceolate-spathulate, the three outer ones obtuse, ⅓ inch broad ; the three inner rather longer and more acute, ¼ inch broad, much spotted with red-purple. Genitalia included ; anthers broad-oblong, under a line long. Barren stem above a foot long, bearing 6-8 oblanceolate leaves in the upper half, which are rigidly subcoriaceous, green and glabrous on both sides, and closely prominently ribbed, narrowed gradually at the base to a broad twisted petiole, the upper ones 3-3½ inches long, ½-¾ inch broad above the middle, the lower ones smaller. Goyaz, in moist, bushy places near the Chapada of Nostra Senhora d'Abadia, *Gardner*, 4369!

15. *A. Burchellii*, Baker, n.sp. Flowering-stems about 3 feet long, straight, glabrous, bearing only a few distant sessile, linear, glabrous leaves, 2-3½ inches long, with revolute edges. Umbel of 3-4 rays, 2-3 inches long, some simple, some forked, bracteated at the base by a few narrow linear leaves 1-1½ inches long, and also bracteated at the forking, and at the middle of some of the simple pedicels. Perianth-limb little over an inch long, all the segments oblanceolate-spathulate, with small spots of claret-purple on a pale ground; the three outer ones obtuse, ⅓ inch broad ; the inner ones of equal length, narrower, and more acute. Longer stamens as long as the perianth. Barren stem 2 feet long, bearing about 20 scattered oblanceolate leaves throughout the upper half, which are 3-4 inches long, nearly an inch broad above the middle, subobtuse, narrowed gradually from the middle to a winged twisted petiole, subcoriaceous in texture, glabrous on both surfaces, rather glaucous beneath, with about five prominently raised ribs. Hills near the city of Goyaz, *Burchell*, 6883-2, 6989 !

16. *A. Sellowiana*, Seubert.

17. *A. brasiliensis*, Spreng.

18. *A. longistyla*, Schenk.

19. *A. zamioides*, Baker, n.sp. Flowering-stem 3-4 feet long, stout, stiff, glabrous, with only a few scattered, linear, sessile, rigidly coriaceous leaves 2-3 inches long. Umbel of about half-a-dozen rays reaching a length of 6-9 inches, all bearing smaller side-flowers beside the large end one, bracteated by a whorl of half-a-dozen linear, ascending leaves 1½-2 inches long, and the forks also bracteated by similar smaller leaves. Perianth-limb 1½ inch long, all the segments oblanceolate-spathulate, furnished with many linear-oblong spots of bright claret-purple, the outer ones obtuse, ⅓ inch broad ; the two inner upper ones rather longer, narrower, and more acute. Genitalia included ; anthers broad-oblong, a line long. Sterile stem 1½-2 feet long, bearing in the upper half 12-20 lanceolate, subcoriaceous, subacute leaves 5-6 inches long, under an inch broad at the middle, sessile, twisted at the base, glabrous, with close, strong, unequal, prominently-raised ribs connected by short cross venules, which are distinctly visible in the dried specimens. Goyaz, in dry shady places on the Serra de Natividade, *Gardner*, 4009.

SUPPLEMENT TO THE JAMAICAN FERNS RECORDED IN GRISEBACH'S "FLORA OF THE BRITISH WEST INDIES."

By G. S. Jenman.

The following enumeration I have drawn up from my own herbarium, with the aid of the "Synopsis Filicum"; but it makes no pretension to completeness, as, probably, several Jamaican species not recorded in Grisebach's "Flora," not here mentioned, are covered in the geography of the "Synopsis Filicum" under the words West Indies.

The numbers preceding the new species have been given to me by Mr. Baker, and indicate his idea of their position in the sequence followed in the "Synopsis Filicum."

Gleichenia revoluta, *H.B.K.*
Cyathea pubescens, *Mett.*
C. insignis, *Eaton.*
Hemitelia Wilsoni, *Hook.*
Hymenophyllum crispum, *H.B.K.*
H. ciliatum, *Sw.*, var. crispatum, *Baker.*
H. microcarpum, *Desv.*
H. Catherinæ, *H.K.*
H. Tunbridgense, *Smith.*
Trichomanes tenerum, *Sprengel.*

There is a large bipinnate *Adiantum*, intermediate between *macrophyllum* and *villosum*, which deserves to be separated from the first of these, with which Mr. Baker has associated it. See Syn. Fil., p. 121.

Hypolepis hostilis, *Presl.*
Cheilanthes microphylla, *Sw.*, var. micromera, *Link.*
C. tomentosa, *Link.* Mr. Nock has fully established this as a Jamaican plant. It grows on exposed rocks near the Cinchona plantations at an altitude of 5000-6000 feet.
Pellæa geraniæfolia, *Fée.*
P. marginata, *Baker.* Grisebach rejects the Jamaica habitat for this. I have it from various places at an altitude of 4000 feet.
Pteris cretica, *L.*
P. Kunzeana, *Agardh.* This is confounded by Grisebach with *podophylla*, a much finer and very different plant.
Lomaria semicordata, *Baker.*
Asplenium monanthemum, *L.*
A. lunulatum, *Sw.*, var. strictum, *Brack.*
A. auritum, *Sw.*, var. rigidum, *Sw.*
A. centripetale, *Baker.*

Of *Asplenium radicans* there are two or three distinct varieties. A plant from the highest ridges, with short tumid involucres, which Mr. Baker considers for the present a variety, may prove distinct.

Aspidium Plaschnickianum, *Kunze*, viviparum, *Fée*, tridens, *Hk.*, and ilicifolium, *Fée*, are all merged into other species by Grisebach. The first three are admitted in the "Synopsis" as species.

Nephrodium Sprengelii, *Hk.*
63*. Nephrodium (Lastrea) Jenmani, *Baker MSS.*, n.sp. Stipes

strong, erect, scaly at the base, 12 or more inches long; frond about 2 feet long, 9-12 inches wide, covered with dense, very minute, pellucid dots; rachis angular, naked; pinnæ numerous, sessile, close, opposite, excepting near the apex, where they pass very gradually into the bluntly serrate, acuminate point, lower ones reduced to mere auricles, longest about 6 inches long, 1 inch wide, the point narrowly acuminate and obtusely-serrate, cut down below nearly to the costa into blunt, slightly crenulate, spreading segments, which are $\frac{1}{2}$ inch long, and 2 lines wide, the lowest pair the largest, and their midribs so curved at the base as to appear to spring from the axil of the costa; sinus narrow, hardly rounded; texture chartaceous; surfaces naked; veins pinnate; branches simple, subdistant, about eight to a side; sori in two rows not quite reaching the apex, little nearer the edge than midvein; involucre fugacious. No. 51, Herb. Kew, 1877.

Nephrodium Grisebachii, *Baker*.

185*. Nephrodium (Eunephrodium) jamaicense, *Baker MSS.*, n.sp. Caudex strong, erect; stipes cæspitose, slightly scaly at the base, 6 inches long, greyish with stellate puberulæ; frond lanceolate, 12-18 inches long, 4-6 inches wide; pinnæ close, sessile, subsessile, or petiolate, 2-3$\frac{1}{2}$ inches long, $\frac{1}{2}$-$\frac{3}{4}$ inch broad, point subentire, acute, or bluntish, below cut $\frac{1}{2}$-$\frac{3}{4}$ down to the costa into equal or unequal, obtuse, or sometimes acute, crenulate segments, with a subreflexed edge, appearing on the upper side as with a thickened margin, lower reduced and reflexed; surface greyish and more or less puberulous with stellate down, and subscabrous throughout; texture firm, subchartaceous; rachis channelled like the stipes; veins raised beneath, but disappearing at the sori, hardly reaching the edge, simple, or openly forked near their apices; branches of the costal pair sometimes forming with the vein running into the sinus a pair of areolæ, all but the lowest pair free; sori small, near the edge below, but receding from it upwards; indusium small, clothed with stellate puberulæ. No. 19, Herb. Kew, 1876.

Nephrodium venustum, *J. Sm.*
N. guadalupense, *Fée.*
Polypodium jungermannioides, *Klotzsch.*
P. Jamesoni, *Hook.*
P. truncicola, *Klotzsch.*
P. inæquale, *Fée.*

132*. Polypodium (Eupolypodium) saxicolum, *Baker MSS*, n.sp. Stipes few, sub-tufted, slender, wiry, erect, $\frac{1}{2}$-1 inch long, from a black, very short and slender rhizome, clothed with short spreading hairs, dark brown, slightly cartilaginous margined above; frond 2-3 inches long, 2-4 lines wide, gradually reduced each way, pinnatifid; segments alternate, short, usually nearly deltoid, rather more than one line wide at the broadly adnate base, 1$\frac{1}{2}$-2 lines deep, the apex blunt, not broadly rounded, edge thin and little reflexed; veins obscure, shortly branched, not reaching the margin; sori 2-4 to a lobe, terminal on the veinlets, confluent, mixed with dense, stiff, dark brown hairs; texture coriaceous; lighter coloured beneath; rachises stiff, more prominent on the under side, threadlike, purple, hardly flexuose, clothed with few

scattered hairs which extend over the surface, principally along the margins of the lobes. No. 84, Herb. Kew, 1877.

135*. Polypodium (Eupolypodium) albopunctatum, *Baker MSS.*, n.sp. Stipes thickly tufted, from a slender, very shortly elongating, rhizome, with black scales, 0-1½ inches long, slender, thinly hairy; fronds flaccid, 3-5 inches long, 2-6 lines wide, pinnatifid; rachis black, filiform, little flexuose; segments alternate, close, sometimes imbricating, numerous, spreading horizontally, bluntly and shortly oblong, adnate at the base, not dilated above, shortly decurrent on the inferior side, 1½-3 lines long, 1-1½ lines wide; margin entire or crenulate-repand; lower pinnæ reduced and more distant, all ultimately deciduous, the hair-like rachises only remaining mixed with the existing fronds; texture very thin; surfaces, with rachis, thinly clothed with soft hairs; veins shortly, simply branched; sori dark brown, 2-6, at the ends of the vein branches, nearer the midrib than margin; upper surface conspicuously sprinkled with white crustaceous dots, corresponding to the sori beneath. No. 35, Herb. Kew, 1877.

159*. Polypodium (Eupolypodium) brunneo-viride, *Baker MSS.*, n.sp. Rhizome stoutish, very shortly elongating, clothed with bright dark-brown acuminate scales; stipes subcæspitose, erect, wiry, blackish, almost polished, naked, 3-5 inches long; rachis immersed, threadlike, flexuose, dark coloured in the lower half, little or not scaly on the upper side; fronds stiffish, 3-8 inches long, 1-1¾ inches wide, pinnatifid; lower segments not reduced; pinnæ ½-1 inch long, 2-4 lines wide, close spreading, point acute or bluntish, gradually widened downwards to the fully adnate, equal, or subequal base; margin entire or faintly crenulate; texture subcoriaceous; veins evident, pinnate, veinlets forked, not reaching the edge, superior branch shorter terminating in the sori; sori uniform, two-serial, intermediate between the midrib and margin; surfaces naked, or almost so; colour bright lurid-green. No 32, Herb. Kew, 1877.

Polypodium rigescens, *Bory*.

188*. Polypodium (Eupolypodium) graveolens, *Baker MSS.*, n.sp. Stipes densely tufted, from a rather stout, fibrous caudex, ½-1½ inches long, slender, wiry, dark-brown, thinly clothed with soft spreading, rusty hair; fronds pendent or prostrate, 5-9 inches long, 1-2½ inches wide, cut down to a narrowly-winged, filiform, dark-coloured, flexuose rachis, into unequal, patent, narrowly linear, bluntish, abruptly dilated, widely adnate, decurrent, sub-distant, pinnæ, which are ½-1½ inches long, 1-1½ lines wide; margin subentire or crenulate; midveins fine, flexuose, their branches very oblique, simple, or producing ⅓-⅔ from the bar a slight external branchlet; sori sub-distant in two contiguous rows, terminal on the vein-branches; surfaces naked; texture subcoriaceous; colour drying grayish; lower pinnæ more or less reduced. No. 73, Herb. Kew, 1877. Remarkable for the strong physicky smell emitted by fresh specimens.

Polypodium squamatum, *L.*

P. thyssanolepis, *A. Br.*

P. angustifolium, *Sw.*, var. amphostemon, *Kunze.*

P. angustum, *Mett.*

Monogramme seminuda, *Baker*, var. minor; frond ½-1¼ inches

long, 1 line wide above ; sori confined to a short depression, not spreading laterally.

Monogramme immersa, *Fée.*

48*. Gymnogramme (Eugymnogramme) schizophylla, *Baker MSS.*, n.sp. Stipes cæspitose, slender, erect, farinose in a young state, chesnut-brown, polished, 1-3 inches long; fronds lanceolate, 6-10 inches long, 2-3 inches broad ; rachises channelled, like the stipes, viviparous at or near the apex ; pinnæ close, sessile, spreading horizontally or little deflexed, 1-1½ inches long, ½-¾ inch broad, lower usually gradually reduced, cut into similar spreading pinnules, which are again cut into delicate, flabellate, 2-fid, cuneate segments, with emarginate-subspathulate lobes ¼ line wide ; costæ very slender, herbaceous, green, compressed ; veins pellucid ; veinlets simple in each lobe, terminating short of the apex ; colour bright green ; texture delicately thin ; both surfaces naked ; sori short, copious on the ultimate lobes. No. 16, Herb. Kew, 1876. Much resembling a pinna of *Davallia fumarioides.*

Antrophyum subsessile, *Kunze.*

2*. Vittaria (Tæniopsis) intramarginalis, *Baker MSS.*, n.sp. Fronds few, subtufted, 1½-3 inches long, 1-1½ line broad, pointed, tapering gradually to the base, with no distinct stem ; texture coriaceous ; edge thin ; sori sunk in two intramarginal slit-like grooves, which fall short of both apex and base ; veins more or less evident, the transverse very short, hardly oblique, distant, connecting an intramarginal vein and forming with the midrib a double row of narrow areolæ ; barren fronds little broader, but only ½-1 inch long. No. 58, Herb. Kew, 1877. Gathered previously by Mr. Wilson.

Vittaria stipitata, *Kunze.*

V. remota, *Fée.*

Hemionites pinnata, *J. Sm.*

Acrostichum hybridum, *Bory*, var.

A. tectum, *Willd.*

Four unnamed *Acrosticha* (*Elaphoglossum*) from the middle and temperate mountain regions, my No. 10, 1877 ; 20, 1875 ; 27, 1876 ; 6, 1877, are, compared with local species only, well-marked plants, and apparently deserving of specific distinction, but, excepting, doubtfully, the first mentioned, Mr. Baker considers them as only varieties.

Osmunda cinnamomea, *L.*

Danæa Moritziana, *Presl.*

United by Grisebach with *alata*, but separated as a species in the "Synopsis Filicum."

Danæa nodosa, *Smith*, var. enodis.

Ophioglossum palmatum, *L.*

Botrychium ternatum, *Sw.*

B. virginianum, *Sw.*

SUPPLEMENTARY NOTE ON INTOXICATING GRASSES.

By H. F. Hance, Ph.D., etc.

Soon after the publication of my article on this subject in last year's Journal of Botany, Prof. Thiselton Dyer was so kind as to write to me, forwarding a copy of the "Experiments with *Lolium temulentum*," of Mr. A. S. Wilson, whose most interesting investigations seem conclusively to disprove the notion that Darnel has any noxious properties. In his note Prof. Dyer says: "Last year Dr. Aitchison sent us from Kashmir a grass which he said was poisonous to cattle. I enclose an extract from his letter. The bulk of the specimens he sent then were *Bromus giganteus*. Now, however, he has sent us a quantity of the hay, and it all turns out to be a plant identical with one in the herbarium from the same country, and named *Stipa sibirica* by Munro. On looking at the specimens preserved of his former sending, I find that "*Stipa sibirica*" is amongst the *Bromus*, so I have no doubt that the *Stipa* is the culprit. It does not quite agree with specimens of *Stipa sibirica*,* nor with the descriptions of *Stipa inebrians*. I send you specimens of it. By the way, a grass from your collection, gathered at "Kalgan, ad magnum murum Sinensium," Sept., 1869, seems not to be *Stipa sibirica*, as it is labelled, but more like *S. parviflora*, Desf." The following is the extract from Dr. Aitchison's letter, dated Gulmuz, Kashmir, 4 Aug., 1875:—"I have just been collecting some good specimens of a grass that is extremely common near Gulmuz. It grows in large tussocks, and is very poisonous to horses and cattle. The cattle are too knowing, and will not eat it. Horses from the plain do eat it and die from its effects, but if quickly treated recover. They become comatose, and lose the power of their limbs. It grows in the Scinde valley also. Whilst there, I heard of it and the cure, viz., smoking them, by making a large fire and keeping the horses head in the smoke. The nose commences to run first, and if it does so freely, the beast is safe. The natives also say that if a cow eats it they give acid unripe apricots, or any acid vinegar, which aids the recovery. A large number of the horses this year at Gulmuz were poisoned by it, none died, as all smoked their horses." It is interesting to note the coincidences between the statement of the French missionary, whose words I gave, and that of Dr. Aitchison. Both remark that the cattle of the locality will not eat the poisonous grasses, and that the loss of locomotive power is one of the principal symptoms, and both assert the utility of acidulous drinks as a remedy in cases of poisoning. Prof. Dyer suggests that the Stipas may be only mechanically poisonous, like *Hordeum pratense*; but, though it is indisputable that various grasses in Europe and Australia cause injury or death to cattle from their irritant properties, the special symptoms in the case of the two *Stipas* and in *Melica* seem to me opposed to such a supposition. In the recently published English translation of Przevalsky's travels, the Alashan poisonous grass is

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* Which, according to Trinius and Ruprecht, is rather a variable species. (Spec. gram. Stipac., 60.)

stated to be a species of *Lolium*, and it is added that the native herds carefully avoid eating it.*

Since my paper was printed, I have obtained Eichwald's work illustrative of the more interesting plants observed in his travel in the Caucasus and on the shores of the Caspian; and I am now quite satisfied from the description and figure he gives of *Stipa caragana*,† Trin., that it is abundantly distinct from my *S. inebriens*. The latter has a much closer more spike-like inflorescence than Aitchison's Kashmir specimens of *S. sibirica*, Linn.; whilst the former more resembles, though with much smaller flowers, the North Chinese grass, which Prof. Dyer is no doubt right in regarding as distinct from the last named plant, from which it differs by its much laxer panicle, longer stalked flowers, longer glumes, and much more strongly twisted and longer awn. I possess no specimens of *S. parviflora*, Desf., which, as well as the beardless-anthered *S. Bungeana*, Trin., has a still longer awn.‡ I take this opportunity of naming and characterising the North Chinese plant

STIPA PEKINENSIS, *sp. nov.*—Radice fibrosa, perennis, culmo $2\frac{1}{2}$-3 pedali erecto nodis levibus vaginis glabris v. hirsutis, foliis linearibus acuminatis plus minus involutis levibus v. scabriusculis 1-$1\frac{1}{2}$ ped. longis $1\frac{1}{2}$-$2\frac{1}{4}$ lin. latis, ligula brevissima lacera panicula laxa lucida flavo-purpureoque tincta radiis 2-6 inæqualibus tenuissimis flexuosis a medio floriferis $1\frac{1}{2}$-$3\frac{1}{2}$ poll. longis, pedicellis $\frac{1}{4}$-1 poll. longis, glumis subæqualibus glaberrimis lanceolatis trinerviis apice lacero-dentatis 6 lin. longis, glumellis involutis subæqualibus $3\frac{1}{2}$-3 lin. longis superiore sparsim inferiore dense adpresse albo-pilosis ex apice integro dense barbato aristem persistentem pubescentem tortam paulo infra medium geniculatam 10 lin. longam exserente, antheris breviter barbatis.

In paradiso imperatorio prope Peking; necnon ad Ku peh kau, juxta magnum murum, mensibus Aug.-Sept., 1866, coll. Dr. S. W. Williams. (Herb. propr., n. 13831.)

THORELIA,

Genus Plantarum novum, propositum a HENR. F. HANCE, Ph. Dre. Acad. Cæs. Leop.-Car. Nat. Cur. Sodali, cet.

CALYCIS crassiusculi tubus campanulatus, levis; lobis 5, tubo æquilongi, ovati, obtusi, symtyxi valvati. Petala 5-7, fauci calycis inserta, orbiculata, brevissime unguiculata v. sessilia, symptyxi imbricati. Stamina indefinita, basi calycinorum laborum inserta, ptyxi inflexa; filamentis æqualibus, filiformibus; antheris basifixis, introrsis,

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* Mongolia, the Tangut country and Northern Tibet, ii., 81. It seems likely that the poisonous plant in the province of Tangut mentioned by Marco Polo (Book i., c. 43), and which Col. Yule suggests may be an *Ericacea*, is identical with our grass.

† Plant. nov. v. min. cognit· itin. caspio-caucas., 41, t. 40.

‡ Trin. and Rupr. Spec. gram. Stipac., 61-62.

bilocularibus, locellis basi paulo discretis. Ovarium inferum triloculare ; stylus simplex, stigmate inconspicuo ; ovula compressa, rugosula, in singulo loculo circ. 12, placentis axilibus uniseriatum adfixa.

Arbor v. frutex, cortice nigricante, facile solubili, ramos rufos nudante. Folia alterna, rigide coriacea, breviter petiolata. Paniculæ ramos terminantes. Flores parvi, bibracteolati.

Genus singulare, inter *Lythraceas* anomalas certe relegandum, nulli hucusque descripto affine, dicani cl. Dri. Thorel, floræ Anamiæ gallicæ sedulo pervestigatori.

T. deglupta, sp. unica.—Ramulis (soluta cortice) striatis, foliis rigidissimis obovatis integerrimis margine revolutis acutiusculis basi subauriculatis tenuiter penniveniis venis supra impressis subtus leviter prominulis costa subtus prominente 3 poll. longis petiolo crasso bilineali, paniculis ad apices ramorum pluribus folia æquantibus angulatis tomentosis ramulis brevibus apice trifloris, floribus tomentosis bilinealibus bracteolis oblongis extus tomentosis intus glabris iis æquilongis stipatis.

In summo monte Kam chai, versus fines siamenses, alt. 2900 ped. supra maris æquor, substrato psammitico, leg. Pierre.

In speciminibus suppetentibus flores nondum expansi ; fructus præterea ignotus.

LIST OF THE PLANTS OBTAINED DURING MR. C. GILES'S TRAVELS IN AUSTRALIA IN 1875 AND 1876.

By Baron Ferd. von Mueller, C.M.G., M.D., Ph.D., F.R.S.

During the four memorable expeditions of Mr. Giles, he was induced, at the writer's request, to form, with the aid of his companions, collections of plants, and to the volume which records his travels from 1872 till 1874 there was appended a full list of the species collected during the first two expeditions. As it seems uncertain whether, irrespective of the parliamentary documents issued in Adelaide, a separate volume on the two last expeditions will appear, it is deemed desirable to refrain no longer from publishing the index of the botanical results of the latter journeys (completed more than a year ago), more especially as the localities of the species now given, except those of the new ones, remained hitherto unrecorded. The leader of the expedition, it may be said to his honour, brought the plants largely together himself, and this under difficulties which none but those who entered the field of exploration themselves can fully understand ; but during the third expedition through a vast extent of scrub-country, rich in a most varied bushy vegetation, Mr. Jesse Young took a leading interest, with the help of Mr. Tietkens, in forming comparatively extensive collections which, with disinterested liberality, were placed for examination at the writer's disposal by the Hon. Thomas Elder, of Adelaide, who defrayed the large outlay for the two last of Mr. Giles's journeys.

The arrangement adopted for this index is the same as that according to which the species of the two first expeditions were arranged; it deviates more particularly from the Candollean or reversed Jussieuan system, followed also in the "Flora Australiensis," by distributing the Monochlamydeæ or Apetalæ, Gymnospermæ excepted, among the other Dicotyledonous plants, according to the nearest affinities, the writer, with some other phytographers, having ever been adverse to retaining the artificial series of the Monochlamydeæ in the natural system. To instance how greatly improved an arrangement according to real affinities is thus gained, it may be mentioned, that the orders characterised by seeds with starchy albumen are distributed through all the five volumes of Dicotyledoneæ of the "Flora Australiensis," Plumbagineæ belonging also to this series as well as Frankeniaceæ, and for this complex of orders the collective appellation of Amyliferæ would be better adapted than that of Curvembryonatæ. Again, Loranthaceæ form, with Santalaceæ, Proteaceæ, and their allies, inseparable groups of plants, the orders of which should not be far severed in the truly natural method of classification.

The present index, as well as that issued in the volume on Mr. Giles's former expeditions, brings together in a connected form most of the plants now known from the more central regions of Australia, and cannot fail to facilitate the study of the natural features and capabilities of these tracts of our continent, while it will likewise add to the documents for phyto-geographic researches. Some plants from small collections secured by other recent explorers are also added, to complete still more the means for an insight into the vegetable features of the interior of the Australian continent.

Melbourne, May, 1877.

Dilleniaceæ.

Hibbertia virgata, R. Br. in Cand. Regn. Veg. Syst. Nat. i., 428. Between Youldéh and the Elizabeth River.

H. rostellata, Turcz. in Bull. Mosc., 1849, ii., 8. A variety with straight and flatter leaves, and larger rather acute sepals; habit of *Leptospermum*. Victoria Springs.

Lauraceæ.

Cassytha melantha, R. Br., Prodr., 404. Near Mount Churchman.

C. nodiflora, Meissn. in Cand. Prodr. xv., i., 252. Near Mount Churchman.

Capparideæ.

Cleome viscosa, L., Sp. Fl., 672. Near MacDonnell's Ranges (C. Giles); between the Rivers Gascoyne and Ashburton; between the Murchison and Yuim; between the Alfred-Marie and Rawlinson Ranges.

Cruciferæ.

Erysimum Blennodia, F. v. M., Fragm. x., 78. Between Youldeh and Elizabeth River.

E. lasiocarpum, F. v. M. Lake Eyre (Lewis).

Lepidium papillosum, F. v. M., in Linnæa, xxv., 370. Between

Youldeh and the Elizabeth River; near Ullaring; between the boundary line and Victoria Springs.

Menkea sphærocarpa, F. v. M., Fragm. viii., 223. Between Youldeh and Ouldabinna.

VIOLACEÆ.

Hybanthus aurantiacus, F. v. M., Fragm. x., 81. MacDonnell's Ranges (C. Giles).

H. floribundus, F. v. M., Fragm. x., 81., var. *exalcarata*. Victoria Springs.

PITTOSPOREÆ.

Bursaria spinosa, Cavan iv. et Descr. iv., 30, t. 350. Near Mount Churchman; Ullaring.

Pittosporum phillyroides, Cand. Prodr. i., 347. North of Fowler's Bay; north of Ouldabinna.

Cheiranthera filifolia, Turcz. in Bull. Mosc. .1854, ii., 364. Between Ullaring and Mount Jackson.

TREMANDREÆ.

• *Tetratheca efoliata*, F. v. M., Fragm. x., 3. Between Ullaring and Mount Jackson.

POLYGALACEÆ.

Comesperma integerrimum, Endl. in Hueg. Enum. 7. Near Mount Churchman.

C. viscidulum, F. v. M., Fragm. x., 4. Victoria Springs.

GERANIACEÆ.

Erodium cygnorum, Nees, in Lehm. Plant. Preia. i., 162. MacDonnell's Ranges (C. Giles); Lake Eyre (Lewis); north of Flower's Bay; from Charlotte Waters through Youldeh towards the Elizabeth River.

Oxalis corniculata, L., Sp. Pl., 435. MacDonnell's Ranges (C. Giles); North of Fowler's Bay; between Youldeh and the Elizabeth River.

MALVACEÆ.

Hibiscus Krichauffii, F. v. M., Report on Babb., pl. 7. Lake Eyre (Lewis); north of Fowler's Bay.

H. Sturtii, Hook. in Mitch. Trop. Austr. 363. MacDonnell's Ranges (C. Giles).

H. Pinonianus, Gaudich. in Voy. Freyc. Bot. 476, t. 100. Ouldabinna.

H. hakeifolius, Giord., Memor. Sopra d'Ibisco, 1837. Near Mount Churchman.

Gossypium australe, F. v. M., Fragm. i., 46. MacDonnell's Ranges (C. Giles).

G. Sturtii, F. v. M., Fragm. iii., 6. MacDonnell's Ranges (C. Giles).

G. Robinsoni, F. v. M., Fragm. ix., 126. Between the Rivers Gascoyne and Ashburton.

Abutilon halophilum, F. v. M. in Linnæa xxv., 381. Between Youldeh and the Elizabeth River.

A. macrum, F. v. M., Fragm. ix., 59. North of Fowler's Bay.

A. tubulosum, A. Cunn. in Mitch. Trop. Austr. 390. MacDonnell's Ranges (C. Giles).

A. Fraseri, Hook. in Mitch. Trop. Austr. 368. Sources of the Ashburton River.

A. otocarpum, F. v. M. in Transact. Phil. Soc. Vict., 1855, 13. Near Lake Eyre (Lewis); between Youldeh and the Elizabeth River.

A. amplum, Benth., Flor. Austr. i., 200. Upper Ashburton River.

Sida virgata, Hook. in Mitch. Trop. Austr. 361. Near MacDonnell's Ranges (C. Giles); between Ouldabinna and the boundary line.

S. inclusa, Benth., Flor. Austr. i., 197. Between the Rivers Ashburton and Gascoyne.

S. petrophila, F. v. M. in Linnæa xxv., 381. North of Fowler's Bay.

S. calyxhymenia, J. Gay in Cand. Prodr. i., 462. Between the boundary line and Victoria Springs; between Youldeh and Ouldabinna.

S. corrugata, Lindl. in Mitch. Three Exped. ii., 13. Lake Eyre (Lewis), north of Fowler's Bay; between Youldeh and Ouldabinna; between the Alfred-Marie and Rawlinson Ranges, Gascoyne and Ashburton Rivers.

Plagianthus glomeratus, Benth. in Journ. Linn. Soc. vi., 103. Between Youldeh and the Elizabeth River, west of the Alfred-Marie's Ranges; Upper Ashburton River.

Malvastrum spicatum, A. Gray, Pl. Fendl., 23. MacDonnell's Ranges (C. Giles); between Yuim and the Murchison River.

Lavatera plebeja, Sims in Bot. Mag. 2269. Near MacDonnell's Ranges (C. Giles), north of Fowler's Bay.

Sterculiaceæ.

Commersonia cuneata, F. v. M., Fragm. x., 22. Between Barrow's and Rawlinson's Ranges; between Victoria Springs and Ullaring.

C. magniflora, F. v. M., l. c., 22. Glen of Palms.

C. melanopetala, F. v. M., l. c., 21. Victoria Springs.

Keraudrenia integrifolia, Stend. in Lehm. Plant. Preiss. i., 236. Between the Rivers Gascoyne and Ashburton; between the Alfred-Marie and Rawlinson Ranges, near Ullaring, near Victoria Springs; between Charlotte Waters and Alice Springs.

Brachychiton Gregorii, F. v. M. in Hook. Kew Misc. ix., 199. Sources of the Ashburton River, from Victoria Springs through Ullaring to Mount Jackson.

Melhania incana, Heyne in Wallich's List, 1200. MacDonnell's Ranges (C. Giles).

Zygophylleæ.

Tribulus terrestris, L., Sp. 387. Lake Eyre (Lewis); MacDonnell's Ranges (C. Giles); north of Fowler's Bay; between Youldeh and the Elizabeth River.

Zygophyllum prismatothecum, F. v. M. in Linnæa, xxv., 373. Between Youldeh and the Elizabeth River.

Z. Billardieri, Cand. Prodr. i., 705. Great Bight.

Z. apiculatum, F. v. M. in Linnæa xxv., 374. MacDonnell's Ranges (C. Giles); Youldeh.

Z. glaucescens, F. v. M., Plants of Vict. i., 228. MacDonnell's Ranges (C. Giles); Youldeh.

Z. iodocarpum, F. v. M. in Linnæa xxv., 375. MacDonnell's Ranges (C. Giles); Victoria Springs.

Z. fruticulosum, Cand. Prodr. i., 705. North of Fowler's Bay.

Nitraria Schoberi, L., Sp. Pl. 638. North of Fowler's Bay.

Rutaceæ.

Eriostemon linearis, A. Cunn. in Hueg. Enum. 16. Between Youldeh and the Elizabeth River.

E. capitatus, F. v. M., Fragm. i., 106. Great Bight.

E. tuberculosus, F. v. M., Plants. of Vict. i., 130; var. *caniculata*. Between Victoria Springs and Ullaring.

Boronia cærulescens, F. v. M. in Transact. Phil. Soc. of Vict. i., 11; var. *spinescens*. Near Mount Churchman.

Geijera parviflora, Lindl. in Mitch. Trop. Austr. 102. Great Bight.

Meliaceæ.

Owenia acidula, F. v. M. in Hook. Kew Misc. ix., 304. Lake Eyre (Lewis).

Sapindaceæ.

Nephelium oleifolium, F. v. M., Fragm. x., 82. North of Fowler's Bay; between Charlotte Waters and Youldeh, thence towards Ouldabinna.

Diplopeltis Stuartii, F. v. M., Fragm. iii., 12. Near the Rawlinson Ranges, beyond the Alfred-Marie Ranges.

Dodonæa viscosa, L., Mantiss. 238. North of Fowler's Bay, between the boundary line and Victoria Springs, beyond the Alfred-Marie Ranges.

D. petiolaris, F. v. M., Fragm. iii., 13. MacDonnell's Ranges (C. Giles); west of the Alfred-Marie Ranges; sources of the Ashburton River; between the Murchison and Gascoyne Rivers.

D. lobulata, F. v. M. in Linnæa 1852, 372. Between Youldeh and the Elizabeth River; between the boundary line and Victoria Springs.

D. inæquifolia, Turcz. in Bull. Mosc., 1858, i., 408. Near Mount Churchman.

D. larræoides, Turcz. l.c. Near Mount Churchman.

D. stenozyga, F. v. M., Fragm. i., 98. Between Youldeh and Ouldabinna.

D. microzyga, F. v. M., Report, 1863, 12. Between Victoria Springs and Ullaring; between Youldeh and Ouldabinna.

Euphorbiaceæ.

Calycopeplus ephedroides, Planch. in Bull. de la Soc. Bot. de France, viii., 31. Near Mount Churchman.

Euphorbia eremophila, A. Cunn. in Mitch. Austr. 348. Lake Eyre (Lewis); MacDonnell's Ranges (C. Giles); north of Fowler's Bay; between Youldeh and the Elizabeth River.

E. Drummondi, Boiss. Cent. Euph., 14. North of Fowler's Bay; between Youldeh and the Elizabeth River.

Bertya Cunningham, Planch. in Hook. Lond. Journ. iv., 473. Victoria Springs.

Monotaxis luteiflora, F. v. M., Fragm. x., 51. Victoria Springs;

near Ullaring; between the Alfred-Marie and Rawlinson Ranges; sources of the Ashburton River.

M. grandiflora, Endl. in Huegel. Enum. 19. Near Ullaring.

Phyllanthus Fuernrohrii, F. v. M. in Transact. Phil. Soc. Vict. i., 15. Between Youldeh and the Elizabeth River.

Beyera opaca, F. v. M. in Transact. Phil. Vict. i., 16. Between Youldeh and the Elizabeth River.

Rhinocarpus muricatus, J. Muell., in Linnæa xxxiv., 61. Near Mount Churchman.

Adriana tomentosa, Gaud. in Ann. Sc. Nat., Ser. 1, vi., 223. MacDonnell's Ranges (C. Giles); between Youldeh and Charlotte Waters; source of the Ashburton River.

Urticeæ.

Ficus platypoda, A. Cunn. in Hook. Lond. Journ. vi., 561. MacDonnell's Ranges (C. Giles); Musgrave's Ranges.

Parietaria debilis, G. Forst. Prodr. 73. MacDonnell's Ranges (C. Giles).

Stackhousiaceæ.

Stackhousia Brunonis, Benth. Flor. Austr. I., 409. Near Mount Churchman.

S. megaloptera, F. v. M., Fragm. viii., 35. Victoria Springs.

S. Huegelii, Endl. in Hueg. Enum. 17. Near Mount Churchman.

S. flava, Hook. Icon. Plant., t. 269; var. *interrupta*. Near Ullaring.

S. viminea, Sm. in Rees Cycl. xxxiii. Between the Alfred-Marie and Rawlinson Ranges.

S. scoparia, Benth. Flor. Austr. i., 409. Near Ullaring.

Macgregoria racemigera, F. v. M. in Caruel's Giorn. 1873, p. 129. Between the Alfred-Marie and Rawlinson Ranges.

Frankeniaceæ.

Frankenia pauciflora, Cand. Prodr., i. 350. Lake Eyre (Lewis); north of Fowler's Bay; Great Bight; near Ullaring; thence towards Victoria Springs.

F. glomerata, Turcz. in Bull. Mosc. 1854, ii., 368; var. *hispidula*. Near Mount Churchman.

F. lævis, L., Sp. Pl. 331. Between the Rivers Gascoyne and Ashburton.

Portulaceæ.

Portulaca filifolia, F. v. M., Fragm. i., 169. MacDonnell's Ranges (C. Giles).

Calandrinia polyandra, Benth. Fl. Austr. i., 172. Between Victoria Springs and Ullaring.

Caryophyllaceæ.

Polycarpæa longiflora, F. v. M., Rep. on Babb., pl. 8. Between the Rivers Gascoyne and Ashburton.

P. corymbosa, Lam. Illustr. 2798. Lake Eyre (Lewis).

Salsolaceæ.

Dysphania plantaginella, F. v. M., Fragm. i., 61. MacDonnell's Ranges (C. Giles); north of Fowler's Bay.

Chenopodium cristatum, F. v. M., Fragm., vii., 11. Great Bight; between Youldeh and the Elizabeth River.

Rhagodia Preissii, Moq. in Cand. Prodr. xiii., ii., 49. Near Mount Churchman.

R. nutans, R. Br., Prodr. 408. Lake Eyre (Lewis); MacDonnell's Ranges (C. Giles).

R. spinescens, R. Br., Prodr. 408. Great Bight; between Ouldabinna and the boundary line.

Enchylæna tomentosa, R. Br., Prodr. 408. Great Bight; between Youldeh and the Elizabeth Rivers, Goscoyne and Upper Ashburton Rivers.

Chenolea paradoxa, F. v. M., Fragm. x., 91. Between the Youldeh and the Elizabeth River.

C. sclerolænoides, F. v. M. Between Youldeh and Ouldabinna.

C. diacantha, F. v. M., l.c. North of Fowler's Bay.

C. echinopsila, F. v. M., l.c., 92. Victoria Springs.

C. divaricata, R. Br. Between Youldeh and the Elizabeth Rivers.

Kochia triptera, Benth. Fl. Austr. v., 185. Near Ouldabinna.

K. sedifolia, F. v. M. in Transact. Vict. Inst. i., 134. Great Bight.

K. oppositifolia, F. v. M., l.c. Great Bight; between boundary line and Victoria Springs.

K. villosa, Lindl. in Mitch. Trop. Austr., 91. Great Bight; between Youldeh and the Elizabeth River.

K. fimbriolata, F. v. M., Fragm., ix., 75. Great Bight.

K. decaptera, F. v. M., Fragm. ix., 75. Great Bight.

Atriplex fissivalve, F. v. M., Fragm. ix., 123. Between Youldeh and the Elizabeth River.

A. halimoides, Lindl. in Mitch. Three. Exped. i., 282. Near Ullaring.

A. leptocarpum, F. v. M. in Transact. Phil. Inst. Vict. ii., 74. Lake Eyre (Lewis).

A. spongiosum, F. v. M., l.c. Lake Eyre (Lewis).

Salsola Kali, L., Sp. Pl. 222. Great Bight; between Youldeh and he Elizabeth River.

Salicornia arbuscula, R. Br., Pr. 411. Near Ullaring

S. australis, Soland. in G. Forst. Prodr. 88. Great Bight.

Ficoideæ.

Aizoon quadrifidum, F. v. M., Fragm. ii., 148. Near Mount Churchman.

Tetragonia expansa, Murr. Comment. Goett., 1783, t. 5. Between Youldeh and the Elizabeth River.

Mollugo Glinus, A. Rich., Flor. Abyssin. i., 48. Lake Eyre (Lewis).

Amarantaceæ.

Ptilotus alopecuroides, F. v. M., Fragm. vi., 227. Near MacDonnell's

Ranges (C. Giles); Victoria Springs; between Youldeh and the Elizabeth River.

P. latifolius, R. Br., Append. to Sturt Central Austr. 25. Lake Eyre (Lewis).

P. obovatus, F. v. M., Fragm. vi., 228. Lake Eyre (Lewis); MacDonnell's Ranges (C. Giles); near Ouldabinna.

P. exaltatus, Nees in Lehm. Pl. Preiss, i., 630. Between Victoria Springs and Ullaring.

P. nobilis, F. v. M., Fragm. vi., 227. Near MacDonnell's Ranges (C. Giles).

P. hemisteirus, F. v. M., Fragm. vii., 231. Near Ouldabinna; between the boundary line and Victoria Springs, thence towards Ullaring.

Gomphrena canescens, R. Br., Prodr. 416. Between the Rivers Ashburton and Gascoyne.

Euxolus interruptus, Moq. in Cand. Prodr. xiii., ii., 272. Between the Rivers Ashburton and Gascoyne.

Polycnemum diandrum. *Hemichroa diandra*, R. Br., Prodr. 409. North of Fowler's Bay.

Polycnemum mesembrianthemum, F. v. M., Fragm. viii., 38. Lake Eyre.

Alternanthera sessilis, R. Br., Prodr. 417. Near Ouldabinna.

Polygonaceæ.

Polygonum aviculare, L., Sp. Pl. 362; var. *plebeia*. Lake Eyre (Lewis).

Muehlenbeckia appressa, Meissn. Gen. Plant. 227. Between Ullaring and Mount Jackson.

Nyctagineæ.

Boërhaavia diffusa, L., Fl. Zeyl, 4. Near MacDonnell's Ranges (C. Giles); between the Rivers Ashburton and Gascoyne; between Youldeh and Charlotte Waters; north of Fowler's Bay.

Phytolaccæ.

Codonocarpus cotinifolius, F. v. M., Plants of Vict. i., 200. Mac Donnell's Ranges (C. Giles); Upper Ashburton River; Victoria Springs; between Youldeh and the Elizabeth River. To this plant the explorers have inappropriately given the name of "Poplar," lauding it as valuable for camel-food.

Gyrostemon ramulosus, Desf. in Memoir. du Mus. vi., 17, t. 6. Between the Ashburton River and the Alfred-Marie Ranges. Poisonous to camels according to Mr. Giles.

Rosaceæ.

Stylobasium spatulatum, Desf. in Mem. du Mus. v., 37, t. 2. Between Yuim and the Murchison River.

Leguminosæ.

Brachysema Chambersii, F. v. M. in Benth. Fl. Austr. ii., 13. Between the Rawlinson and Alfred-Marie Ranges, towards the sources of the Ashburton River.

B. daviesioides, Benth. Fl. Austr. ii., 13; var. *planiuscula*. Victoria Springs.

Mirbelia oxyclada, F. v. M., Fragm; iv., 12; var. *germine sericeo*. Between the Alfred-Marie and Rawlinson Ranges.

M. microphylla, Benth. Flor. Austr. ii., 37. Between Victoria Springs and Ullaring.

Gastrolobium obovatum, Benth. in Bot. Reg. xxv., App. 14. Near Mount Churchman.

G. calycinum, Benth., l.c. Near Mount Churchman.

G. seorsifolium, F. v. M., Fragm. x., 35. Near Ullaring; Victoria Springs.

G. elachistum, F. v. M., Fragm. ix., 67. North of Fowler's Bay.

Isotropis juncea, Turcz. in Ball. Mosc. 1853, 251. Near Mount Churchman.

I. canescens, F. v. M., Fragm. x., 51. Victoria Springs.

Gompholobium Shuttleworthii, Meissn. in Plant. Preiss. i., 39. Near Mount Churchman.

Burtonia gompholobioides, F. v. M., Fragm. x.. 34. Victoria Springs.

Jacksonia nematoclada, F. v. M., Fragm. x., 50. Near Mount Churchman.

J. rhadinoclada, F. v. M., Fragm. x., 38. Near Ullaring.

J. spinosa, R. Br. in Ait. Hort. Kew iii., 13. Victoria Springs, var. *longiflora*; between Victoria Springs and Ullaring.

Daviesia ulicina, Sm. in Annals of Bot. i., 506. Between Youldeh and the Elizabeth River.

D. acanthoclona, F. v. M., Fragm. x., 32. Victoria Springs.

Aotus Tietkensi, F. v. M., Fragm. x., 33. Victoria Springs.

Phyllota Luchmanni, F. v. M., Fragm. x., 33. Victoria Springs; near Ullaring.

Bossiæa Walkeri, F. v. M., Fragm. ii., 120. Between Youldeh and Ouldabinna.

Templetonia egena, Benth. Fl. Austr. ii., 170. Upper Ashburton River; between the boundary line and Victoria Springs.

T. retusa, R. Br. in Ait. Hort. Kew iv., 269. Great Bight.

Crotalaria Cunninghami, R. Br., App. to Sturt's Central Austr. 8. Sources of the Ashburton River; MacDonnell's Range (C. Giles).

C. dissitiflora, Benth. in Mitch. Trop. Austr. 386. Between Youldeh and the Elizabeth River. Var. *eremæa*; Lake Eyre (Lewis).

Indigofera viscosa, Lam. Diction. iii., 247 (*I. enneaphylla*, L.) MacDonnell's Range (C. Giles)

I. monophylla, Cand. Prodr. ii., 222. Upper Ashburton River.

I. brevidens, Benth. in Mitch. Trop. Austr., 385. Near Ullaring, thence towards Victoria Springs.

I. lasiantha, F. v. M., Report on Greg. Plants, 6. Near Ouldabinna.

Swainsona Burkei, F. v. M. in Benth. Flor. Austr. ii., 218. MacDonnell's Ranges (C. Giles), near Ouldabinna; between the Alberga and Mount Olga.

S. phacifolia, F. v. M. in Benth. Flor. Austr. ii., 221. Between Youldeh and the Elizabeth River.

S. colutoides, F. v. M., Fragm. x, 6. Between Ullaring and Mount Jackson.

Swainsona phacoides, Benth. in Mitch. Trop. Austr., 363. Between Victoria Springs and Ullaring.

Psoralea patens, Lindl. in Mitch. Three Exped. ii., 9. Between Yuim and the Murchison River ; var. *eriantha ;* Lake Eyre (Lewis).

P. leucantha, F. v. M. in Transact. Vict. Inst. iii., 54. Lake Eyre (Lewis).

Clianthus Dampieri. A. Cunn. in Trans. Hort. Soc. Lond., Sec. Ser., i., 522. Near Mount Hale ; between the boundary line and Victoria Springs.

Sesbania aculeata, Pers. Synops. ii., 316. Lake Eyre (Lewis).

Rhynchosia minima, Cand. Prodr. ii., 385. Between the Rivers Gascoyne and Ashburton.

Trigonella suavissima, Lindl. in Mitch. Three Exped. i., 255. Lake Eyre (Lewis).

Vigna lutea, A. Gray, Bot. of Wilkes's Exped. i., 454. Between the Rivers Gascoyne and Ashburton.

Caulinia prorepens, F. v. M., Fragm. viii., 225. Between the Alfred-Marie and Rawlinson ranges; near Ullaring.

C. prostrata, F. v. M., Fragm. vii., 128. Between Ullaring and Mount Jackson.

Glycine clandestina, Wendl. Bot. Beobacht. 54. Between Youldeh and Ouldabinna ; between Ullaring and Victoria Springs.

Cassia phyllodinea, R. Br., App. to Sturt's Centr. Austr. 15. Between Ouldabinna and the boundary line.

C. eremophila, A. Cand. in Vogel, Synops. Cass. 47. Between Youldeh and Charlotte Waters ; north of Fowler's Bay ; Victoria Springs.

C. artemisioides, Gaud. in Cand. Prod. ii., 495. MacDonnell's Range (C. Giles); Great Bight; north of Fowler's Bay ; between the boundary line and Victoria Springs ; between Youldeh and Ouldabinna.

C. pleurocarpa, F. v. M., Fragm. i., 223. MacDonnell's Range (C Giles); near Mount Churchman; near Ullaring; Victoria Springs.

C. cardiosperma, F. v. M., Fragm. x., 50. Between Victoria Springs and Ullaring.

C. notabilis, F. v. M., Fragm. iii., 28. West of the Alfred-Marie Ranges.

Petalostylis labicheoides, R. Br., App. to Sturt's Centr. Austr., 17. Lake Eyre (Lewis) ; MacDonnell's Range (C. Giles) ; between Yuim and the Murchison River; between the Alfred-Marie and Rawlinson Ranges ; near Mount Churchman.

Neptunia monosperma, F. v. M. in Benth. Flor. Austr. ii., 300. Upper Ashburton River.

Acacia continua, Benth. Flor. Austr. ii., 322. Between Youldeh and the Elizabeth River.

A. colletioides, A. Cunn. in Hook. Lond. Journ. i., 336. Between Youldeh and the Elizabeth River.

A. acanthoclada, F. v. M., Fragm. iii., 127. Victoria Springs.

A. acanthoclona, F. v. M. Near Mount Churchman ; between Victoria Springs and Ullaring.

A. latipes, Benth. in Hook. Lond. Journ. i., 334. Near Mount Churchman.

A. pyrifolia, Cand. Memoir. Legum, 447. Between Yuim and the Murchison River.

A. tetragonophylla, F. v. M. in Journ. Linn. Soc. iii., 121. Between Youldeh and Ouldabinna; between Victoria Springs and Ullaring.

A. Burkitti, F. v. M. in Benth. Flor. Austr. ii., 400. Between Youldeh and Ouldabinna.

A. salicina, Lindl. in Mitch. Three Exped. ii., 20. North of Fowler's Bay; between Youldeh and Ouldabinna; Victoria Springs; from the Alfred-Marie Ranges to the Ashburton River.

A. calamifolia, Sweet in Lindl. Bot. Reg. t. 839. Between Youldeh and the Elizabeth River.

A. acuminata, Benth. in Hook. Lond. Journ. i., 373. Near Mount Churchman.

A. homalophylla, A. Cunn. in Hook. Lond. Journ. i., 365. North of Fowler's Bay.

A. quadrimarginea, F. v. M., Fragm. x., 31. Near Ullaring.

A. denticulosa, F. v. M., Fragm. x., 32. Near Mount Churchman.

A. aneura, F. v. M. in Linnæa xxvi., 627. Near Mount Churchman; near Ullaring; between Youldeh and Ouldabinna; Victoria Springs.

Myrtaceæ.

Darwinia micropetala, Benth. in Journ. Linn. Soc. ix., 181. Between Youldeh and the Elizabeth River.

D. purpurea, Benth., l.c., 180. Near Mount Churchman.

Pileanthus peduncularis, Endl. in Annal. de Wien. Mus. ii., 196. Near Mount Churchman.

Verticordia Fontanesi, Cand. Prodr. iii., 209. Near Mount Churchman.

V. Preisii, Schauer in Lehm. Pl. Preiss. i., 101. Near Mount Churchman.

V. chrysostachya, Meissn. in Journ. Linn. Soc. i., 41. Near Mount Churchman.

V. picta, Endl. in Annal. Wien. Mus. ii., 194. Near Mount Churchman; Victoria Springs; thence towards Ullaring.

V. pennigera, Endl. in Hueg. Enum. 46. Near Mount Churchman.

V. monadelpha, Turcz. in Bull. Mosc. 1847, 158. Near Mount Churchman.

V. Brownii, Cand. Prodr. iii., 209. Near Mount Churchman.

V. chrysantha, Endl. in Ann. Wien. Mus. ii., 195; var. *brevifolia*. Near Mount Churchman.

Calycothrix longiflora, F. v. M., Fragm. i., 12. Between the Rawlinson and Alfred-Marie Ranges.

C. Creswelli, F. v. M., Fragm. x., 27. Near Mount Churchman; between Ullaring and Mount Jackson.

C. plumulosa, F. v. M., Fragm. x., 27. Near Mount Churchman.

C. Birdii., F. v. M., Fragm. x., 26. Between Victoria Springs and Ullaring.

Thryptomene trachycalyx, F. v. M., Fragm. x., 25. Between Ullaring and Mount Jackson.

T. stenocalyx, F. v. M., Fragm. x., 23. Victoria Springs.

T. urceolaris, F. v. M., Fragm. x., 25. Between Victoria Springs and Ullaring.

T. auriculata, F. v. M., Fragm. x., 24. Near Ouldabinna ; thence towards Youldeh.

T. Maisonneuvii, F. v. M., Fragm. iv., 64. West of the Alfred-Marie Ranges ; sources of the Ashburton River.

T. Elliotti, F. v. M., Fragm. ix., 62. North of Fowler's Bay; Youldeh ; thence towards the Elizabeth River ; near Ouldabinna.

T. racemosa, F. v. M., in Benth. Flor. Austr. iii., 64. Near Mount Churchman.

T. hymenonema, F. v. M., Fragm. x., 26. Victoria Springs.

Wehlia coarctata, F. v. M., Fragm. x., 23. Near Mount Churchman.

W. thryptomenoides, F. v. M., Fragm. x., 22. Victoria Springs ; thence towards Ullaring.

Bæckea Behrii, F. v. M., Fragm. iv., 68 ; var. *brevifolia*. Near Mount Churchman.

B. cryptandroides, F. v. M., Fragm. x., 29. Near Ullaring ; thence towards Victoria Springs.

B. achropetala, F. v. M., Fragm. x., 29. Between Ullaring and Mount Jackson.

Punicella carinata, Turcz. in Bull. de l'Acad. de St. Pétersb., 1852, 411. An erect variety with broader and blunter leaves, more strongly ciliated ; the flowers of a fiery crimson. Between Ullaring and Mount Jackson.

Kunzea sericea, Turcz. in Bull. Mosc., 1847, 162. Also a variety with crimson flowers. Near Mount Churchman ; near Ullaring ; thence towards Mount Jackson.

Leptospermum lævigatum, F. v. M., Annual Report, 1858, 22. North of Fowler's Bay ; between Youldeh and the Elizabeth River.

L. erubescens, Schauer in Lehm. Pl. Preiss. i., 121. Near Mount Churchman ; between Victoria Springs and Ullaring ; thence towards Mount Jackson.

Melaleuca adnata, Turcz. in Bull. de l'Acad. de St. Pétersb., 1852, 425 ; var. *abietina*. Near Mount Churchman.

M. hamulosa, Turcz. in Bullet. de Mosc. 1847, 165. Near Mount Churchman.

M. uncinata, R. Br. in Ait. Hort. Kew Ser. edit. iv., 414 ; var. *brevifolia*. Near Mount Churchman ; between Victoria Springs and Ullaring ; thence towards Mount Jackson.

M. laxiflora, Turcz. in Bull. de l'Acad. de St. Pétersb., 1852, 421. Near Mount Churchman.

M. leiocarpa, F. v. M., Fragm. x., 55. Near Mount Churchman.

M. parviflora, Lindl. Bot. Reg. xxv., App. 8 Great Bight.

M. filifolia, F. v. M., Fragm. iii., 119. Between Ullaring and Mount Jackson.

M. radula, Lindl., Bot. Reg. xxv., App. 8. Between Ullaring and Mount Jackson.

Beaufortia squarrosa, Schauer in Act. Acad. Cæsar. Leop. Carol. xxi., 15. Near Mount Churchman.

B. intristans, F. v. M., Fragm. x., 30. Near Mount Churchman.

Calothamnus Gilesii, F. v. M., Fragm. x., 31. Victoria Springs.

C. aper, Turcz. in Bull. de Mosc. 1849, ii., 25 ; var. *lasiocalyx*. Near Mount Churchman.

Eucalyptus Youngiana, F. v. M., Fragm. x., 5. Victoria Springs; at Oldea on sand hills; also sixty miles from Fowler's Bay.

E. salubris, F. v. M., Fragm. x., 54. Between Victoria Springs and Ullaring.

Haloragee.

Haloragis confertifolia, F. v. M.; Fragm. x., 53. Near Ullaring; Victoria Springs.

H. acutangula, F. v. M., in Transact. Vict. Inst. i., 125. Near Ullaring.

H. odontocarpa, F. v. M., Fragm. i., 108. Between Youldeh and Ouldabinna.

H. trigonocarpa, F. v. M. Fragm. x., 84.

Loudonia aurea, Lindl., Bot. Reg. xxv., App. 42. Near Ullaring; thence towards Victoria Springs; near Mount Churchman.

L. Roei, Schlecht, Linnæa xx., 648. Near Mount Churchman.

Cucurbitaceæ.

Cucumis acidus, Jacq., Observ. Bot. iv., 14. Lake Eyre (Lewis); MacDonnell's Range (C. Giles); Upper Ashburton River.

Mukia scabrella, Arn. in Hook. Journ. iii., 276. Sources of the Ashburton River.

Casuarineæ.

Casuarina Decaisneana, F. v. M., Fragm. i., 61. Sources of the River Ashburton.

C. acutivalvis, F. v. M., Fragm. x., 61. Victoria Springs.

C. Huegeliana, Miguel in Lehm. Pl. Preiss. i., 640. Between Victoria Springs and Ullaring; var. *lasiocarpa;* from Ullaring to Mount Jackson.

C. microstachya, Miquel. in Lehm. Pl. Preiss. i., 642. Near Mount Churchman.

C. corniculata, F. v. M., Fragm. x, 62. Near Mount Churchman.

C. glauca, Sieber in Spreng. Syst. Veget. iii., 803. Between Youldeh and Ouldabinna.

Santalaceæ.

Exocarpus spartea, R. Br., Prodr. 356. Near Mount Churchman.

E. aphylla, R. Br., Prodr. 357. North of Fowler's Bay; Great Bight.

Leptomeria Preissii, A. de Cand. Prodr. xiv., 678. Near Mount Churchman.

Santalum lanceolatum, R. Br., Prodr. 356. Between the Alfred-Marie Ranges and the Ashburton River.

S. acuminatum, A. de Cand. Prodr. xiv., 684. Between Youldeh and Ouldabinna.

Loranthaceæ.

Loranthus Exocarpi, Behr. in Linnæa xx., 624. Lake Eyre (Lewis); towards the Elizabeth River; between Youldeh and Charlotte Waters. Var. *canus;* MacDonnell's Ranges (C. Giles).

L. pendulus, Sieber in Cand. Prodr. iv., 294. Between the boundary line and Victoria Springs. Var. *Melaleucæ*; Great Bight.

Viscum articulatum, Burm. Flor. Indit. 311. Between Youldeh and the Elizabeth River.

(To be continued.)

SHORT NOTES.

Botanical Nomenclature.—I have read with much interest the editorial remarks accompanying M. de Candolle's valuable letter on a point of botanical nomenclature, and I entirely concur in the view of the subject there taken. I have always been of opinion that an author who transfers a species to another genus is at liberty to give it what name he likes best, and that as the oldest name it has henceforward a right to be maintained; of course it may be usually advisable to retain the same specific adjective, as a link between the two names and a help to memory; but that cannot be made an obligation. My reasons for thinking so are two: Firstly, that such has been the universal practice from Linnæus downwards to a very recent date, and that to regard it as contrary to rules would lead to the recasting of a host of names in general use; secondly, that since, logically speaking, a specific name consists of two words coupled together, and not of the second one only, as is too often erroneously stated, when the first word is taken away the whole name falls to the ground, and the one put in its place is necessarily a new one, and it can matter little whether its component parts belonged to the previous name or not.

Allow me to subjoin another remark. M. de Candolle does capital service to natural history, when he so pointedly shows the real meaning of the practice naturalists have got into of putting the name of an author after that of a plant or group of plants (or animals) they mention. The practice, as originally revised by Caspar Bauhin in his "Pinax" (if I am not mistaken), and kept up to our days, is to be considered merely an abridged sort of bibliographical reference to the author's works, so as to give more precision to the name that is mentioned by referring it to a description, and has nothing whatever to do with the history of the plant or its discovery, as some have imagined, and is much less a token of honour offered to that particular person whose name is thus tacked on. Such being the case, the rule must be, as M. de Candolle puts it, never to make an author say that which he never intended to say. If the rule had always been understood and attended to, we should not have fallen into the absurd custom, prevalent now amongst cryptogamists especially, of quoting a botanist after a name he never knew, and that generally with the additional incumbrance of a second generic noun thrust in a parenthesis between the proper one and its following adjective.—T. Caruel.

Blysmus compressus in Herts.—Specimens of this rare species have been sent to us from Dr. C. E. de Crespigny, collected by him this year on Rickmansworth Common Moor in Hertfordshire, from which county it has not previously been recorded. It is probable that the specimens in Forbes Young's herbarium at Kew, labelled "Harefield" (see Fl. Middlesex, p. 302) may be from the same station; or the plant may grow in more than one place along the course of the Colne.—In the British Museum herbarium are specimens from the home counties of Kent, Surrey, and Sussex (the latter queried in Topogr. Bot.), also from Hants and Northampton (the latter additional to the counties given in that work). Possibly the plant is less uncommon than generally supposed.—Henry Trimen.

XEROTUS SANGUINEUS, *W. G. Smith*, lately figured in the Journal is described in Tr. Linn. Soc., xxii., p. 129, under the name of *Craterellus papyraceus*, Berk. & Curtis. It was gathered by Fendler in Venezuela. It is a good *Craterellus*, but certainly is not congeneric with *Xerotus*.—M. J. BERKELEY.

Extracts and Abstracts.

OCCURRENCE OF INULINE BEYOND COMPOSITÆ.

Das Inulin-Vorkommen ausserhalb der Compositen. VON GREGOR KRAUS. (Bot. Zeitung, May, 1877.)

HITHERTO, with two or perhaps three exceptions, Inuline has been known to occur only in Compositæ. Dr. Kraus has recently been carefully studying the subject, and he finds that Inuline is present in several genera of *Campanulaceæ*, *Lobeliaceæ* and *Goodenovieæ*, as also in *Stylidium*. The substance was also looked for in other plants, especially in species deprived of starch, but always without success. The test employed has already been made public ;* it consists in placing a thin slice of the tissue under examination in glycerine of customary concentration ; if Inuline, be present a highly refractive mass separates from the cell wall and gradually assumes the shape of a ball. Earlier or later a sphere-crystal with a punctiform centre and radiate structure results from this mass ; and this formation of sphere-crystals, which often takes place within a few minutes, can be watched by means of the polariscope. Sometimes, however, mulberry-like masses are found and not single sphere-crystals. In all observed instances of occurrence of Inuline, starch is only slightly developed ; *e g.*, in the chlorophyll-granules of the leaves (*Selliera*, *Lobelia*, *Stylidium*), cortical parenchyma (*Stylidium*), stomatal guard-cells and clathrate cells. In *Tupa* the above-ground parts contain sugar instead of Inuline; but, as a rule, where those parts are genuine reservoirs of nutriment they also contain Inuline. In the genus *Selliera*, moreover, a cell may contain both sugar and Inuline. The substance can be prepared by washing, maceration and boiling for some hours; after which the cooled and filtered fluid is to be evaporated to the thickness of syrup, when the Inuline separates overnight as a thick white mealy sediment. This sediment can be freed from sugar and other impurities by washing first with pure and then with alcoholic water; finally, it is to be evaporated to perfect dryness.

The chemical reactions of the substance, as thus obtained, are

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* See Bot. Zeit. 1876, p. 604, where will also be found details of a proposed test for sugar. The author finds that if cells containing sugar be placed in strong alcohol they are seen to be suddenly filled with numberless fine drops ; if placed in glycerine a refractive mass separates from the cell-wall as with Inuline, but it shows no tendency to crystallise, and, indeed, entirely disappears after a time. This is a valuable discovery, as by means of it we shall soon have accurate information as to the place of origin of sugar in nectaries, leaf-glands, &c.

similar to those of the Inuline of *Compositæ*. The paper contains also a tabulation of the principal differences between Inuline and Amylodextrine. S. M.

The Sexual Reproduction of Lichens.

Beiträge zur Entwickelungsgeschichte der Flechten. Von E. Stahl. Heft 1. Leipzig. 1877.

This first part is mainly devoted to an account of the sexual reproduction of the Collemaceæ. When one searches the thallus of *Collema microphyllum*, proceeding from the middle to the edge, one sees apothecia in all stages of development. Near the edge, the first foundations of apothecia are found in the form of small filamentary jointed coils consisting of an outer investment formed of closely netted hyphæ, surrounding a number of large cells showing a more or less pronounced spiral arrangement. From this coiled structure (ascogonium) a several-celled filament (trichogyne) proceeds to the surface of the thallus, where it terminates in a short free tip. The number of ascogonial coils is tolerably constant (usually $2\frac{1}{2}$-3), but this is not the case with the cells composing the trichogynial filaments, which may vary between six and twelve or more in number, according to the position and direction of the trichogyne: the free end of the latter, which is never seen on the under surface of the thallus, is either flask-shaped or cylindrical with a rounded tip; sometimes, indeed, it may be divided into two equal or unequal parts. In this species the carpogonia sometimes fail entirely at the border of the thallus, their place being taken by spermogonia, but both structures also occur mingled. The spermatia are scattered over the thallus by the agency of rain, and come in contact with the glutinous ends of the trichogynes, and by this means a sexual union is effected closely agreeing with the process observed in Florideæ. It is evident that the small size of the spermatia, and the short time of their remaining in contact with the trichogyne, are both circumstances which render a section showing actual union exceedingly difficult; but the author seems tolerably satisfied with what he saw on this head. In the ascogonium the first result of fertilisation is seen in the increased size of its cells, the number of which increases by formation of transverse septa. The paraphyses take origin as branches from the primitive coil, and the number of these branches increasing, one next sees the beginning of the hymenium. The asci then arise as outgrowths from the ascogenous threads; and by this time the trichogyne is sharply distinguishable from the enlarged cells of the ascogonium, while it has undergone changes which give it a different appearance to what it had before fertilisation, these changes consist in the collapse of the free end, the assumption of a knotted form owing to the thickening of the transverse walls of its cells, and to their before transparent contents becoming yellowish and highly refractive.

A process essentially similar is described as occurring in other species of the same genus, and in other genera. In the case of *Collema pulposum*, some parts of the thallus though plentifully provided with ascogonia and trichogynes, yet do not produce apothecia; this is

thought to be due to the absence of spermogonia. In these instances of abortion the walls of the trichogynial cells become somewhat thinner, and their contents collect in the direction of the long axis. In *Physma* hermaphroditism is seen, the same organ producing first spermatia, and afterwards ascogonia and trichogynes.

The memoir concludes with a short comparison of the development of the spore-fruit of Lichens with that of other Ascomycetes and of Florideæ.

Before finishing this short notice, we must take the opportunity of remarking that Dr. Stahl's comparison of the germination of spermatia with the artificial emission of pollen-tubes in solutions of sugar, is overthrown by the culture-experiments of Cornu, who asserts that he was successful in *reproducing individuals from spermatia alone.*

S. M.

Origin of Chlorophyll in the Cotyledons of Phaseolus vulgaris.

Ueber die Entstehung der Chlorophyll in den Keimblattern von Phaseolus vulgaris. Von Dr. G. Haberlandt. Botanische Zeitung. June. 1877.

The great father of modern botanical microscopy, H. von Mohl, considered that three substances usually go to the composition of chlorophyll; the colouring matter, a substance not becoming blue under influence of Iodine, which he suspected to be of protein nature, and starch which may, however, sometimes be absent. With regard to the question whether starch is formed after or before the completion of the chlorophyll-grain, he held that both cases occur, and this was the view generally adopted by subsequent writers until the time of Sachs, who, working at the question with great persistency and originality of method, came to the conclusion that chlorophyll is formed by a cleaving of protoplasm into "etiolin" grains, and their subsequent assumption of a green colour under the influence of light. Sachs distinguishes those cases where a starch-grain becomes surrounded by a covering of green plasma (as occurs in the green Potato) under the name of "false" chlorophyll, and by this means cautiously clears the ground for his generalisation that the main function of chlorophyll is to produce starch. Sachs, however, did not experiment on cotyledons which contain starch while in the dormant state; this has been done by the present author, and the result of his work, carried on by the method advocated by Sachs himself, shows some discrepancy with the conclusions of the older physiologist. In the resting condition the cells of the cotyledons are filled with mostly simple starch-grains of variable size (the few compound grains consisting of 2-5 small granules) surrounded by proteinaceous matter containing granules; the starch is almost entirely absent from the epidermis and from the subepidermal layer on the underside. After twenty-four hours soaking the proteinaceous granules have nearly disappeared, and a turbid emulsion now surrounds the starch-grains, while the regenerated nucleus has become evident. At this stage the cotyledons, isolated by removal of the testa, were placed in the bottom of a glass dish covered with moist filter paper, and a bell glass was put on the glass in such

a way that access of air was not prevented, the apparatus was then brought to a window, but was not exposed to full sunlight; the temperature ranged between 15-19 C. After two days (reckoning from commencement of soaking) small secondary compound parietal starch-grains made their appearance in the subepidermal layer, and similar but smaller grains in the epidermis; these became perfected after three days from commencement of swelling. The same process went on in the underlying tissue. The cotyledon had now assumed a pale-yellowish colour, which became more marked after four or five days, and after a week the cells of the now green cotyledons contained "false" chlorophyll granules, the starch-grains having been surrounded by a covering of green plasma. These so-called "false" chlorophyll granules are different from those to which the term is usually applied, since instead of being composed of one grain of starch, several granules united into a compound grain are surrounded by the green plasma; they are, in fact, precisely similar, both anatomically and physiologically, to the starch-enclosing "true" chlorophyll granules.

After the lapse of eight or nine days from commencement of germination, the enclosed starch granules begin to disappear, separating from one another, and the intervals between them becoming occupied by green plasma; so that by the tenth day one sees simply a number of granular chlorophyll bodies; before this has taken place, however, those bodies have undergone division. If a young plantule with green cotyledons be placed in the dark, the chlorophyll granules will not completely lose their starch, which is always present in sufficient quantity to give them a granular appearance. The reason of this is that the cotyledons also contain large primary starch-grains which furnish material for growth, and it is only when these have been exhausted that the assimilation of the secondary granules included in green plasma takes place.

The author concludes, therefore, that "true" chlorophyll granules are sometimes formed by the surrounding of compound grains of starch with green plasma. Essentially the same thing holds with *Phaseolus vulgaris*, *Phaseolus multiflorus*, *Polygonum Fagopyrum*, and two species of *Lupinus*. In the Pea *simple* starch-grains become surrounded with green plasma, and afterwards develope into "true" chlorophyll granules. S. M.

Botanical News.

Articles in Journals.—July.

Flora.—J. Klein, "Algological Notes."—F. Arnold, "Lichenological Fragments."—Id., "Mosses of the French Jura."—K. Prantl, "*Hysterium Pinastri*, Schrad., the cause of the disease of the Fir."

Bot. Zeitung.—C. Gobi, "On the mode of growth of the thallus of *Phæosporeæ*."—W. J. Behrens, "On the flowers of grasses."—L. Celakovsky, "On the ovular theory."—J. Reinke, "Remarks on the ter-

minal growth of *Dictyotaceæ* and *Fucaceæ*."—M. de Borbas, "De Iridibus nonnullis præcipue Hungaricis."—C. Warnstorf, "Two new European Mosses" (*Hypnum capillifolium* and *Sphagnum obtusum*).

Oesterr. Bot. Zeitschr.—G. Strobl, "On the Italian Violets."—F. Hauck, "Algæ of the Adriatic" (contd.).—V. von Borbas, "*Dianthus Levieri*, Borb."—L. Menyharth, "Waldstein and Kitaibel's species of *Melilotus*."—W. Voss, "Mycology of Corinthia."—J. Kugy, "The Mangert in the Julian Alps."—F. Antoine, "Botany at the Vienna Exhibition" (contd.).

Magyar Növénytanilapok.—S. Schulzer v. Muggenburg, "Animadversiones in cell. et ill. E. Fries 'Hymenomycet. Europ.' ed. 2."—"Two botanical books among the MSS. of the library of King Corvinus."

Nuov. Giorn. Botan. Italiano (10 July).—A. Andres, "On the shell of Diatoms and recent investigations of its contents."—A. Jatta, "Botany of the Gran Sasso."—G. Bagnis, "Fungi collected during the Italian Expedition in Tunis in 1875" (tab. 9).—G. Archangeli, "On the gonidia question" (tab. 10).—G. Passerini, "Fungi Parmensi" (contd.).—A. Piccone, "Prof. A. Sassi's collection and the herbarium of the Royal Lyceum at Genoa."

Hedwigia.—K. Schidermayr, "*Puccinia malvacearum* in Austria."

Silliman's American Journal.—A Gray, "Germination of the genus *Megarrhiza*."

Journ. of Linnean Soc. (July 14th).—J. G. Baker, "Systema Iridacearum."

New Books.—M. P. Edgeworth, "Pollen" (Hardwicke and Bogue).—P. L. Simmonds, "Tropical Agriculture" (London, E. and F. N. Spon).—J. Moeller, "Beiträge zur vergleichenden Anatomie des Holzes," 6 plates (Vienna, 1876).—A. de Bary, "Vergleichende Anatomie der Vegetationsorgane der Phanerogamen und Farne" (Leipzig, Engelmann, 14mk).—O. Kuntze, "Die Schutzmittel der Pflanzen gegen Thiere und Wetterungunst und die Frage vom Salzfreien Urmeer" (Leipzig, Felix).—J. Britten, "Popular British Fungi" ("Bazaar" Office, 3s. 6d.).

In the "Mémoires couronnés et autres mémoires" of the Royal Academy of Brussels, M. A. Cogniaux has published the second fascicle of his Diagnoses de Cucurbitacées nouvelles. The account of the genus *Anguria* is completed by a critical review of the species; and the genera *Ceratosanthes*, *Apodanthera*, *Elaterium*, *Cyclanthera*, *Elateriopsis*, and *Echinocystis* are successively treated of in a historical *resumé*, an enumeration of the known species and detailed descriptions of the numerous novelties. A plate illustrates the genus *Gurania* by figures of the anthers in the different species.

The Report for 1876 of the Botanical Locality Record Club has reached us, drawn up by Mr. T. B. Blow, the Curator. It contains numerous localities, for the most part new, but many previously published. A list of plants observed in the Isle of Mull by Mr. G. Ross is appended. It is announced that with the next Report there will be

issued an appendix forming a supplement to "Topographical Botany." The Club has also issued a catalogue of British Mosses, compiled by C. P. Hobkirk and H. Boswell, on the plan of the "London Catalogue," which should prove very useful to collectors.

As an appendix to the Hungarian Journal of Botany there will be printed a catalogue of the Flowering plants and Ferns of Servia, Bosnia, Herzegovina, Montenegro, and Albania, compiled by P. Ascherson and A. Kanitz. The first part containing the Ferns and Grasses accompanies the August number; the distribution of each species through the provinces is given. A general list of the flora of this part of Europe has long been wanted.

Hugh Algernon Weddell died suddenly at Poictiers last month from heart disease, from which he had suffered for several years; though English by birth, he was completely French by adoption. His valuable monographs of the *Urticeæ* and the *Podostemaceæ*, and his monograph of *Cinchona* give him a high rank as a systematic botanist, but he is perhaps best known in connection with the flora of S. America. His travels with the expedition of M. de Castelnau commenced in 1845, and the "Voyage dans le nord de Bolivie," was published. The two volumes of the magnificent "Chloris Andina" appeared in 1855-57. M. Weddell was at one time aide-naturaliste at the Muséum, in early life he paid much attention to the plants near Paris, and gave active help in the preparation of Cosson and Germain's "Flore des environs de Paris," first published in 1842. He was also a good lichenologist. His loss is great, and is felt widely, especially in England, where he had many intimate friends.

We have also to record the death of M. Pancher in New Caledonia during the course of a second expedition to that group. His valuable collections have formed the material of numerous memoirs by Brongniart, Gris, and others.

The death is also announced of Emmanuel Le Maout, the author of several excellent elementary works, and, with M. Decaisne, of the "Traité général de Botanique" of which an English translation by the late Mrs. Hooker was published.

The meeting of the British Association at Plymouth was very poorly attended by Botanists. Professors A. Dickson and McNab, Dr. Trimen, Mr. Briggs, Mr. Hardy, of Manchester, and some others were present. Naturally there were few botanical papers; the following were read in the Departments of Zoology and Botany:—"On the species of *Rosa* near Plymouth," by T. R. A. Briggs; "On the occurrence of *Lavatera sylvestris* in Scilly," by H. Trimen; "Notes on anticipatory inheritance in plants especially with reference to the embryology of parasites," by G. S. Boulger; "On the structure of the pitcher of *Cephalotus*," by Prof. A. Dickson; "On the movements of water in plants," by Prof. W. R. McNab; "On the characters of plants as affected by locality," by A. S. Wilson; "On the classification of plants," by Prof. W. R. McNab; "On Hæckel's Phylogeny of plants," by the same; "On the fossil Flora of the Arctic regions," by O. Heer. In the Department of Anthropology, Prof. Rolleston read a paper on the Flora and Fauna of prehistoric times. A fuller report must be deferred till a future number.

Original Articles.

ALABASTRA DIVERSA

AUCTORE S. LE M. MOORE.

Pars prima.

UVARIA ASTERIAS, *sp. nov.*

U. foliis breviter petiolatis ovato-oblongis cuspidatis basi leviter truncato-cordatis supra nitentibus subtus appresse pubescentibus deinde fere glabris, floribus conspicuis exaxillaribus subsessilibus, sepalis parvis fere omnino liberis deltoideo-oblongis, petalis sepala multoties superantibus ima basi connatis oblongo-linearibus basi pulvino minime elevato crenulato et pubescente indutis, antherarum connectivo truncato papilloso-pubescente, toro medio leviter depresso, carpellis oblongis, ovulis numerosis 2-serialibus, fructibus ——.

Hab.—Ad littora zanzibarica juxta Mombasa. "Arbor 5 met. alt." Hildebrandt, no. 1987!.

Caulis erectus, crispe pubescens deinde glaber. Folia 4-7 cm. long., 2·8-3·3 cm. lat.; petiolus robustus 0·2-0·3 cm. long., pubescens. Sepala 0·4 cm. long., extus strigoso-pubescentia. Petala circiter 4·0 cm. long., extus basi tenuiter sericeo-pubescentia, utrinque puberula. Torus medio depresso hirsutus.

U. Kirkii, Oliv. (Bot. Mag., t. 6006) arcte affinis, sed calyce parvo petalisque pulvinatis angustioribus facile cognoscenda. Probabiliter sunt flores pallide luteis ut *U. Kirkii*.

REAUMURIA FLOYERI, *sp. nov.*

Erecta, ramis ad angulum prope rectum divergentibus, foliis planis sparsis spathulato-oblongis quasi subpetiolatis obtusissimis, axillaribus nullis, ramorum floralium reliquis subconformibus, bracteis erectis foliis subsimilibus (basi paullo latioribus) calyci subæquilongis margine minute undulatis, calycis pæne ad basin partiti laciniis erectis oblongo-linearibus, petalis fere oblongis calycem æquantibus lobo altero obsoleto, filamentis basi integris, placentis circiter 7-ovulatis.

Hab.—Ad Henjam prope sinum persicum. Coll. E. A. Floyer.

Planta quippiam misera. Folia 1·0-1·4 cm. long., sub apice 0·25 cm. lat. Petala foliis subæquilonga. Ob paucitatem materiei infaustam ovula exactius numerare non potui.

Ex affinitate *R. Stocksii*, Boiss., et *R. hypericoides*, L. Ab illa abhorret inter alia equidem foliis planis sparsis majoribus basi manifeste angustatis, ab hac vero forma foliorum diversa, calycis laciniis angustioribus et longioribus, petalis fere oblongis.

TRISTELLATEIA AFRICANA, *sp. nov.*

T. caule subvolubili pilis adpressis sparsim pubescente deinde glabro copiose lenticellifero, foliis oppositis ovatis acutis basi leviter

oblique cordatis nervosis glabris, petiolis fere sub lamina 4- vel 5- plo longiore subopposite 2-glandulosis pubescentibus, racemis terminalibus axillaribusve foliis 2-3-plo longioribus pubescentibus, pedunculis infra medium opposite 2-bracteolatis, calycis segmentis oblongis obtusis pubescentibus, petalis spathulato-oblongis dorso carinatis breviter unguiculatis, staminibus paullo exsertis, ovario depresso-ovoideo hirsuto stylo unico robusto vel stylis 2 vel 3 gracilioribus (tertio si adsit fere effeto) coronato, stigmatibus truncatis, fructus immaturi alis membranaceis sparsim appresse pubescentibus.

Hab —Ad Mombasa, 300 ped ; Kirk. Ad littora zanzibarica juxta Mombasa. Hildebrandt, no. 1974 !

Folia 5-8 5 cm. long. ; petioli 0·8-2 0 cm. long., basi paullo incrassati. Racemi erecti. Bracteæ oppositæ vel subopposita, subulatæ, 0·3 cm. long., pubescentes. Pedunculi 1 2-1·7 cm. long., pubescentes. Calycis segmenta 0·4 cm. long. Petala 1 cm. long., glabra, flavescentia. Staminum filamenta exteriora paullo longiora, glabra ; connectivum dorso carinatum ad latera obscurissime puberula.

An interesting addition to a genus which, although having its head-quarters in Madagascar and extending eastward as far as Borneo, New Ireland, the Philippines and Tropical Australia, has not hitherto been met with on the African Continent. I am not sure whether the calyx is or is not glandular ; on some of the sepals there occur swellings either at the base or tip, but I have not ascertained whether these are really glands. With regard to the styles, there are usually two running together, but so readily separable that they can scarcely be considered as united. In one case only did I examine a truly unistylar flower, though inspection of dried flowers would seem to show that this is perhaps the ordinary state. It is rather difficult to make out the structure of the immature fruit ; I think that each carpel has six wings, two dorsal and four lateral. These wings are at once remarkable for their membranaceous consistence ; they are generally oblong in shape, and the longest has a length of 0 6 cm.

The plant was originally discovered by Dr. Kirk in 1873, but his specimen being unfortunately without fruit, there was no chance of placing it generically.

Impatiens Textori, *Miq.*, nulla cum specie boreali-Indica mihi cognita congruit. Planta japonica a cl. Bisset juxta Kashio lecta facile ex optima figura in " Sô Mokou " posita secernenda.

Ormocarpum Kirkii, *sp. nov.*

O. caule subtereti ad nodos tumido puberulo mox glabrato cortice albo longitudinaliter sulcato sparsissime ac obscurissime aculeato cincto, foliis alternis vel unilateraliter congestis 4-5-jugim impari-pinnatis, stipulis triangulari-lanceolatis glabrescentibus, petiolo puberulo obscurissime aculeato, foliolis subsessilibus ovato-oblongis obtusis vel apiculatis basi nonnunquam leviter obliquis vel subcordatis supra fere glabris subtus secus costam mediam conspicuam pilis paucis brevibus strigosis appressis munitis, racemis folia subæquantibus paucifloris, pedicellis gracilibus 1·2-1·7 cm. long. puberulis, bracteis minutis deltoideis, bracteolis subfloralibus ovatis, calycis prope omnino glabri lobis 2 superioribus subconnatis, alis carinam obtusam paullo superan-

tibus, vagina staminea utrinque fissa, ovario 5-ovulato, legumine mihi ignoto.

Hab.—Ad fluvium "Tola" dictum ditione Somalensi coll. Kirk (fragmentum). Ad oras zanzibaricas juxta Mombasa legit Hildebrandt, no. 1935 !

Stipulæ 0·3 cm., petiolus 1·5-3·0 cm , foliola 0·4-0·7 cm., bracteoli vix 0·2 cm. long. Calycis lobi late oblongi obtusi. Flores lilacini ; alæ 1·7 cm. long. Ovarium hirsutulo-pubescens ; stylus (præter basin pubescentem) glaber.

Ab *O. bibracteato*, Baker (*Acrotaphros*, Hochst. et Steud.), differt precipue foliolorum forma et numero, inflorescentia semper vere racemosa, calyce fere glabra.

Ormocarpum mimosoides, *sp. nov.*

O. ramis ramulisque patentibus validis strictis pallide flavidis illis crebro breviter sulcatis glabris his obscure glutinoso-aculeatis, foliis 3-5-jugim imparipinnatis, stipulis lanceolatis glabris, foliolis subsessilibus oppositis vel suboppositis ovatis obtusis vel breviter apiculatis coriaceis glabris supra minutissime corrugatis subtus pallidis obscure nervosis, pedunculis foliis brevioribus congestis unifloris hirsutis, bracteolis subfloralibus amplis ovato-rotundatis, calycis glabri lobo unico superiore longiore, alis carinam obtusissimam æquantibus, vagina staminea utrinque fissa, ovario circiter 6-ovulato.

Hab.—In collibus "Manganja" dictis Africæ orientalis legit Waller. Comm. Kirk.

Foliolorum rachis 3-4·5 cm. long., obscure glutinoso-aculeata. Foliola 0·5-0·7 cm., pedunculus circiter 1·7 cm. long. Bracteolæ 0·25 cm. lat., striatæ, obscure ciliatæ. Calycis lobus s ıperior 0·35 cm., lobi reliqui 0·2 cm. long., omnes sparsim ciliati. Alæ 1·7 cm. long. Ovarium hirsutum, 0·6 cm. long. Legumen non vidi.

Planta ob foliola lata coriacea et pedunculos 1-floros hirsutos et bracteolorum magnitudinem, et calycem uno aspectu cognoscenda.

Galactia argentifolia, *sp. nov.*

Tota planta præter faciem foliorum superiorem partesque floris omnes calyce excepta appresse sericeo-pilosa, caule folioso erecto tereti demum crispe pubescente, foliis 3-foliolatis, stipulis parvis persistentibus, foliolis ovato-oblongis obtusis terminali longius lateralibus breviter petiolatis, racemis foliolis subæquilongis paucifloris, floribus mediocribus opposite bibracteatis, calycis lobis 4 inæqualibus integris lanceolato-oblongis vel oblongo-ovatis acutiusculis, vexillo suborbiculari leviter emarginato, alis carinam subæquantibus, stamine vexillari libero, ovario circiter 7-ovulato, stylo secus dimidium inferius piloso.

Hab.—Crescit in locis apricis insulæ Mombasa regione zanzibarica (Hildebrandt, no. 1931 !).

"Suffrutex vel frutex 1·5 met. alt." Folia supra viridia subtus nervosa, circiter 5 cm. long. Stipulæ lanceolatæ, 0·5 cm. long. Petiolus 2·5 cm., petiolulique laterales 0·3 cm. long., hi basi subulatim 2-stipellati ; petiolus terminalis 1·0 cm. long., prope medium 2-stipellatus. Pedunculi 4 0 cm , bracteæque lanceolatæ 0·5 cm. long. Flores rosei. Calycis tubus bracteas paullo excedens ; lobi 0 6-0·8 cm.

long. Vexillum 1·4 cm. long., 0·9 cm. lat.; alæ late oblongæ, obtusæ, vexillo paullo breviore. Filamenta leviter inæqualia. Ovarium pilosum. Legumen immaturum utrinque angustatum, 1 cm. long., sericeo-tomentosum.

Planta mirabilis habitum nec characteres florales specierum multarum sectionis Americanæ *Collææ* præbet.

PITHECOLOBIUM (§ *Unguis-cati*) ? ZANZIBARICUM, *sp. nov.*

P. caule glabro striato cinereo vel subflavido, spinis validis rectis æqualibus basi divergentibus, foliis solitariis congestisve, pinnis 1- vel 2- jugis basalibus interdum alternis, foliolis 3-5-jugis oblongis basi oblique truncato-cordatis apice obtusis vel oblique mucronulatis glabris subnitentibus nervosis siccitate atris, petiolis brevibus sub ortu petiolulorum glandulam crateriformem gerentibus, capitulis longe ac tenuiter pedunculatis globosis, pedunculis axillaribus solitariis vel binis in exemplario nostro nequaquam paniculatis basi obscure involucratis, calycis lobis brevissimis triangulari-deltoideis, corollæ glabræ calycem 4-plo excedentis lobis triangularibus, filamentis corolla 2-plo longioribus, legumine immaturo lineari apice angustato medio quasi articulato valde curvato.

Hab.—Ad oras zanzibaricas juxta Mombasa legit Hildebrandt (no. 1939!).

Arbor 3 met. alt. (fide Hildebrandt). Foliola 0·5-1·0 cm. long., 0·2-0·5 cm. lat.; petiolula 1·2 cm. long. Pedunculi 1·5-3·0 cm. long., glabri. Corolla 0·2 cm. long.

Mihi videter *P. diversifolio*, Bth. proxime accedere sed multis notis ab illo differt. Spectat ad *Calliandram ? geminatam*, Bth., planta zeylanica, cujus fructu ignoto, prima facie a cl. Bentham ad *Pithecolobiam* relata, deinde ob affinitatem hypotheticam cum *Calliandra alternante* pro specie generis *Calliandræ* eodem ab auctore habita fuit. Ostendat itaque characteres aliquos sectionis *Samaneæ*.

PARNASSIA FOLIOSA, I. Hook. et Thoms. (*P. nummularia*, Maxim., *fide* Franch. et Sav.), crescit in China centrali (Kiukiang) ubi eam legit cl. Shearer. Stirps japonica, me recentissime monente cl. C. B. Clarke, speciem ad indicam rite referenda.

Vidi in herb. Kew. CORNI species 2 alternifoliæ gerontogeæ nondum (ut apparet) descriptæ. Harum altera in regione Sinensi a Fortune et japonica a Maingay necnon nuper a cl. Bisset reperta ab altera sikkimensi et bhotanensi precipue calyce urceolato (haud campanulato) differt. Ambæ *C. alternifoliæ*, L. f. sunt affines, sed cymis laxis facile distinguendæ. Vidi etiam *C. brachypodæ*, C. A. Mey. (*C. macrophyllæ*, Wall ?), specimen ex Herb. Lugd.-Bat. comm. in quo fortasse sint folia interdum alterna. Exsistit autem hoc loco quædam quæstio difficilis; num hæc species sint vere semper alternifoliæ?

RHODODENDRON (§ *Isusia*?) QUINQUEFOLIUM, *Biss. et S. Moore, sp? nov.*

Elatum, ramosum, ramis tegmentis foliisque fere glabris, foliis membranaceis ad apicem ramulorum brevium ac validorum vel elongatorum ac gracilium 5- (rarissime 4-) verticillatis rhombicis apice breviter apiculatis margine brevissime sericeo-ciliatis pallideque purpureis

reticulato-nervosis facie superiori pilis paucis adpressis obtectis secus costam centralem pubescente inferiore præter basin costæ centralis floccoso-pubescentem glabris, petiolis brevibus glabratis, tegmentis paucis circiter 4-seriatis superioribus oblongis inferiora ovata 2-plo excedentibus omnibus fere glabris, floribus solitariis vel binis, pedunculis folia subæquantibus, calycis minimi lobis acute triangularibus glabris vel obscure ciliatis, corolla campanulata ultra medium 5-loba tubo brevi lato, staminibus 10 valde inæqualibus stylo brevioribus.

Hab.—Ad Kintoki ditione japonica legit I. Bisset.

Rami 0·15-0·2 cm. crassi, tereti. Folia matura 3-4 cm. long., 1·5-2·0 cm. lat. Tegmenta inferiora 0·2-0·4 cm., calycisque lobi circiter 0·1 cm. long. Corolla 3 cm. diam.

In varietatem abludet foliis sparse ac longiuscule ciliatis pedicellisqe pilosulis notatam.

Ab sectione a cl. Maximowicz enunciata (Rhod. As. Orient., p. 32) abhorret tegmentis exterioribus manifeste brevioribus, sed habitus omnino sectionis illius. Sine dubitatione spectat ad *R. indicum*, Sweet. Speciebus ab omnibus Asiæ orientalis differt glabritie, foliis stricte plerumque 5-verticillatis, pedunculis elongatis, &c. Dubium est, ut opinor, an hybrida non sit inter hoc genus et speciem aliquam generis affinis.

Gentianæ squarrosæ, Ledeb. specificatio quoad regionem japonicam nequaquam est dubia. Cl. Bisset hanc speciem in statu fructifero ad Ahchisihama nuperrime legit; præterea stirpis icon bona in "Sô Mokou Zoussetz" (vol. iv., fol. 59) est posita, sub nomine *G. pedicellatæ*, Wall., plantæ indicæ haud japonicæ.

Sabbatiæ gracilis, Salisb., varietas floribus calycisque laciniis parvis crescit in insulis Bahama. Specimen ante oculos modo habui a cl. præfecto Guill. Robinson communicatum.

Comanthosphace, *gen. nov.* (*Labiatæ*; *Pogostemoneæ*).

Calyx tubulosus, superne paullo ampliatus, subregulariter 5-fidus (lobi 2 antici paullo majores). Corollæ tubus calycem plus minus superans, superne leviter ampliatus; limbus subpatens, 2-labiatus; labio postico 2-lobo; antici 3-lobi lobo centrali ovato, lateralibus posticos subæquantibus multo majore. Stamina 4, longe exserta, subæqualia, recta; filamenta valida, nuda; antheræ ovoideæ, confluentia 1-loculares. Discus elevatus, integer. Stylus longe exsertus, æqualiter 2-fidus. Nuculæ immaturæ oblongæ, 4-laterales. Herbæ erectæ, foliosæ, caulibus sæpe tantum obscure 4-angularibus. Folia opposita, grosse serrata, membranacea. Verticillastri pauciflori, obscure bracteati, in spicas elongatas terminales vel axillares digesti.

Genus includit *Elsholtziæ* species 4 Miquelianus japonicas, quippe *E. japonicam*, *E. stellipilam*, *E. sublanceolatam*, *E. barbinervem* a cl. Bentham (Gen. Pl. ii., 1180) ad *Pogostemonem* relatas et sollerter cum *P. travancorensi*, Bedd. comparatas; ab hoc genere dissident vero, me judice, de calyce aliquanto irregulari atque corolla perspicue bilabiata et 5-loba. Ob corollæ structuram ad *Elsholtziæ* species aliquas proprius accedere videntur, sed abhorrent staminibus discoque antice in glandulam non tumente.

Blepharis pratensis, *sp. nov.*

B. caule ramoso tereti scabriusculo deinde glabro, foliis subsessilibus 4-ternatim verticillatis papyraceis lanceolatis vel oblongo-lanceolatis obtusis vel breviter apiculatis integris margine revolutis supra subnitentibus obscure puberulis subtus scabridis, spicis terminalibus interdum vero axillaribus plerumque 2-vel 3- cruris raro simplicibus brevibus, pedunculis spicas subæquantibus 4-angularibus robustis scabriusculis, bracteis papyraceis lanceolatis apiculatis integris vel sparsim spinoso-dentatis 1-nerviis puberulis, bracteolis membranaceis plerumque 2-3-nerviis puberulis intimis latioribus ac calycis lobos 2 longiores subæquantibus, calycis segmento posteriori ovato-lanceolato apiculato integro anteriori lanceolato-oblongo apice bifido, corollæ labio anteriori 1·5 cm. long. 7·0 cm. lat., filamentis glabris, antheris loculo altero omnino obsoleto 1-locularibus, capsulis mihi ignotis.

Hab.—In pratis humidis littorum zanzibarensium coll. Hildebrandt (no. 1906 !).

Frutex circiter 5 met. alt. Internodia 3·0-7·5 cm. long., raro breviora. Folia 3-6 cm. long., 0·4-1·0 cm. lat. Flores cærulei. Pedunculi 0·5-1·3 cm. long. Bracteæ circiter 0·7-1·2 cm. long. Segmentum calycis posterius 3-nervium, 1·5 cm. long., anterius 2-nervium paullo excedens; segmenta lateralia lanceolata, 1 cm. long., puberula. Corollæ tubus angustus, 0·25 cm. long.; labii anterioris lobi ovati, obtusi ; posterioris brevissimi, rotundati, glabri. Staminium posticorum filamenta incurva, 0·5 cm. long.; anticorum paullo breviora, incrassata.

B. involucratæ, Solms (Schweinfurth Fl. Æthiop., p. 107), evidenter arcte affinis, differt attamen, ut ex descriptione patet, internodorum longitudine, foliorum magnitudine et vestitu, bracteis, floribusque majoribus (an itaque inflorescentia fissa?).

Count Solms speaks of the inflorescence of his species as being usually axillary, though it would appear from the description to be essentially similar to that of *B. pratensis ;* viz., at the base of the short peduncle is seated a whorl of four leaves. It is quite plain that this subfloral whorl is nothing else than a whorl of foliage leaves, the axis bearing which is a stem and not a peduncle. On the specimen before me in only one case can I see a truly axillary inflorescence, and that is on a badly developed shoot.

4497 Strobilanthes formosana, *sp. nov.*

Ramosa, caule ad nodos inferiores radicante crasso tetragono hirsuto-pubescente, foliis breviter-petiolatis vel subsessilibus lanceolato-ovatis vel obovatis serrato-crenatis sparsim hirsutulis paribus interdum inæqualibus, pedunculis oppositis pauci- (1-3) floris foliis brevioribus, calycis laciniis subæqualibus linearibus obtusis corolla 3-plo breviore, corollæ rectæ obscure puberulæ tubo sensim ampliato limbi lobis rotundato-ovatis obtusis, staminibus 4, filamentis longioribus infra ad latus internum ciliatis brevioribus nudis, capsula oblonga calycis laciniis dimidio longiore.

Hab.—In Ins. Formosa (Oldham, no. 406 !).

Folia 1·5-7·0 cm. long., 1-3 cm. lat. Pedunculi 1·0-2·7 cm. long.,

pubescentes. Calycis laciniæ 0 8 cm. long., sparsim appresse pubescentes. Stamina inclusa.

Ex affinitate *S. Wallichii*, Nees, a quo precipue differt habitu et vestitu et corolla recta.

The bracts of this species are ovate and somewhat acuminate in shape, with a length of 0·7 or 0·8 cm., and they usually fall off long before the opening of the flowers, leaving scars at the base of the calyces. In one instance, however, the bracts are persistent, and have taken on the appearance of foliage leaves, as occurs in *S. Wallichii*. For this reason I have refrained from citing the difference in bracteation among the other characters which separate the Formosan from the Indian plant.

PEDICULARIS GLORIOSA, *Biss. et S. Moore, sp. nov.*

Elata, foliosa, caule fistuloso hirsuto-pubescente superne glabrato, foliis magnis vel parvis sparsis vel subcongestis longe petiolatis pinnatisectis vel interdum vere pinnatis segmentis lobatis vix pinnatifidis supra scabridis subtus pallidis fere glabris lobis serratis vel incisis facie superiore costarum subhirsuto- vel furfuraceo- pubescentibus infe-riore pilis sparsis instructis vel glabris, pedunculo unico a nobis viso axillari foliis majoribus subæquilongo apice paucifloro basi leviter hirsuto-pubescente excepta glabro floribus magnis, bracteis, ovatis vel ovato-spathulatis serratis calyce minoribus, calycis membranacei 5-lobi tubo 0·8 cm. long. lobo postico oblongo circiter 0·1 cm. long. reliquis inter se æqualibus triangulari-oblongis obtusis dentato-serratis 0·4 cm. long., corollæ tubo aliquid gracili 2·5 cm. long. sub limbo ampliato, galea erecta vel potius levissime incurva antice minute bifida secus latera barbato-ciliata 1 cm. long., labii ampli patentis lobis subæqualibus lateralibus late oblongis centrali obovato omnibus obtusimis, filamentis prope basin tubi insertis compressis basi pilosiusculis, antheris omnibus sub galea approximatis obscurissime puberulis, ovario calycis tubo circiter dimidio breviore.

Hab.—In Japonia ad Oyama legit I. Bisset.

Caulis basi 5 cm. apice 3 cm. crassus. Laminæ 7-16 cm., pedunculi 2-9 cm., bracteæ 0·7 cm. long. Corollæ tubus medio 0·3 cm. lat. Antheræ basi apiculatæ.

Stirpem insignem civem nullius sectionis Benthamianæ denominare potui, sed forsitan inter *Edentulas* difficile digerendam. A *Siphonanthis* discrepat tubo minus gracili et longo superno ampliato ; a *Personatis* corollæ labio patente. A *P. grandiflora*, Fisch., et *P. Sceptro*, L., insigniter differt præter multas notas foliis, inflorescentia axillari, bracteis minoribus.

PERISTYLUS PARISHII, *Rchb. f.*, planta Moulmeinensis crescit etiam in ditione Sikkimensi. Hujus speciei specimina v. v in hort. Kew. culta a cl. Gammie communicata.

OPHIOCYTIUM COCHLEARE, *Braun*, sparsissime occurrit in stagnis prope Thornton Heath comitatu Surrey. Genus nondum, nisi fallor, in insulis Britannicis est reperta.

In eodem loco viget in variis algis confervaceis APHANOCHÆTE REPENS, *Braun*. Genus (sensu suo subgenus) a cl. Rabenhorst inter algas anglicas non includitur.

Mr. Bisset's Japanese Collection.

Reference has been made in the above notes to plants collected in Japan by Mr. Bisset. The collection of which these specimens form a part is a very valuable one, and very different from ordinary Japanese sets, which have usually been collected in the neighbourhood of ports open to Europeans. Now, however, that the interior parts of the country are being opened up, we may look forward to a large increase in the knowledge of its flora; and an additional advantage will reside in the fact of Mr. Bisset's being on the spot, where he intends to throw his energies into critical study of the species. I have thought it might be useful to append a list of the more noteworthy Phanerogams of the collection, with localities.

Viola sylvatica, var. *imberbis macrantha*, A. Gray. Otsuku. April.

Medicago sativa, L. Yokohama. September. Not in Franchet and Savatier's "Enumeratio."

Desmodium Oldhami, Oliv. Chogo. October.

Vicia pseudo-orobus, F. & Mey. Oyama. October.

V. sativa, L. Neigishi. April. Not in Franchet and Savatier's "Enumeratio."

Dumasia truncata, S. & Z. Yokohama. September.

Sophora angustifolia, S. & Z. Yokohama and Oeso. May.

Rubus hakonensis, Fr. & Sav. Compared with a specimen and unpublished description kindly sent by M. Franchet. Mr. Bisset's plant appears to have lost its stipules, otherwise it seems precisely similar to typical *R. hakonensis*. Oyama. October.

Rubus incisus, Thbg. Oyama. April.

Photinia villosa, DC. Senkokuhara. May.

Saxifraga cortusæfolia, S. & Z. Oyama. October.

Chrysosplenium album, Maxim. Hakone. May.

Ludwigia ovalis, Miq. Identified from the figure in "Sô Mokou." Yokohama. September.

Melothria Regelii, Naud. In flower. Yokohama. September.

Abelia serrata, S. & Z. M jagase. April.

Lonicera gracilipes, Miq. Mori, Bukenji, Oyama and Susugaya. March and April.

Rubia chinensis, Regel. Exactly as figured in "Sô Mokou," but without flower or fruit. Oyama. October.

Schizocodon soldanelloides, S. & Z. Kintoki. May.

Valeriana flaccidissima, Maxim. Oyama. April.

Scabiosa japonica, Miq. A variety with short involucral bracts. Near Garuma. October.

* *Tylophora sublanceolata*, Miq., var. *obtusula*, Fr. & Sav. (*Vincetoxicum* sensu Maxim. et Franch. & Sav.). Yokohama. July.

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* Being unaware of the divergence between M. Maximowicz and Mr. Bentham with regard to the true position of the pollinia, and to the consequent limitation of the genera *Tylophora* and *Vincetoxicum*, I had overlooked Miquel's species—which, by the bye, is not at Kew—and thought Mr. Bisset's plant to be new, a mistake for the escape from which I am indebted to M. Franchet. I am at one with Bentham rather than with Maximowicz on the general question; thinking that the position of the caudicle should determine the genus, not the mere direction taken by the pollinia.

Erythræa Centaurium, L. Yokohama. July. Cultivated. Not in Franchet and Savatier's "Enumeratio."

Gentiana Thunbergii, Griseb. Oyama. April.

G. Buergeri, Miq. Kanagawa. November.

Salvia nipponica, Miq. Oyama. October.

Leonurus macranthus, Maxim. Yokohama. October.

*Comanthosphace** (*Elsholtzia sublanceolata*, Miq., *Pogostemon*, Bth.). sp. Oyama. October.

Chelonopsis moschata, Miq. Oyama. October.

Veronica cana, Wall. Ojigoku. May.

Lactuca stolonifera, A. Gray. Mujanoshta. May.

Prenanthes acerifolia, Bth. (*Nabalus*, Maxim.). The typical state and a variety with longer-petioled and more membranous leaves which dry green, and pilose-hirsute stem, petioles and peduncles; the flowers are pale blue, much as shown in "Sô Mokou." Oyama. October.

Saussurea ussuriensis, Maxim., var. *pinnatifida*. Oyama. October.

Ainsliæa apiculata, Schz. Bip. Yokohama and Mine. November.

Pertya scandens, Schz. Bip., *forma ovata; fide* Fr. & Sav. Mine. November.

Macroclinidium robustum, Maxim. Kanagawa. November.

Senecio Schmidtii, Maxim. (sub *Senecilli*). Agrees perfectly with description and with the figure in "Sô Mokou." Manadzuru. May.

S. Zuccarinii, Maxim. Manadzuru. May.

Gynura pinnatifida, DC. Yokohama. July.

Erigeron canadense, L. Yokohama. September. Not in Franchet and Savatier's "Enumeratio."

Aster dimorphophyllus, Fr. & Sav. Recognised from the few indications given in the "Enumeratio." There are two forms, at first sight looking very different from each other; one specimen has cordate- or ovate- acuminate, irregularly incised, dentate-mucronate or simply undulated leaves; the other has the leaves 3- or 5- palmatifid or palmatipartite. Oyama. October. This would make a very elegant decorative plant.

Gnaphalium Sieboldianum?, Fr. et Sav. I feel tolerably satisfied about this, though the "Sô Mokou" figure is evidently a poor one.

Polygoni nepalensis, Meissn. *lusus*. Oyama. October. (Named by M. Franchet.)

Amaranthus Blitum, L. Yokohama. September. Not in Franchet and Savatier's "Enumeratio."

Beta maritima, L. Yokohama. June. Not in Franchet and Savatier's "Enumeratio."

Euphorbia Sieboldiana, Morr. et Dne. Yokohama, Atami and Bukenji. April and May.

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* M. Maximowicz (Gen. Pl., l.c.) considers all the four species of Miquel as varieties of one. As we have not sufficient material to determine this question, I have thought it better not to attach a specific name to Mr. Bisset's specimen.

(See p. 293.)

Quercus dentata, Thbg. Oyama. October.
Cypripedium japonicum, Thbg. Yokohama. May.
Platanthera tipuloides, Ldl. Yokohama. July.
Polygonatum falcatum, A. Gray. Mujanoshta. May.
Croomia japonica, Miq. var. *heterosepala*, Baker. One of the two outer sepals is much larger than its fellow, as shown in the "Sô Mokou" figure. Kiga. May.
Carex japonica, Thbg. The typical state and a varietal (?) one with much shorter spikelets, precisely similar to a specimen of the American Exploring Expedition named *C. japonica* by Asa Gray. Mujanoshta. May.
C. excisa, Boott. Senkoku. May.
C. remota, L. Hata. May.
Muehlenbergia japonica, Steud. (ex descript.) Oyama. October.
Festuca parvigluma, Steud. Mujagi. May.
Brylkinia caudata, F. Schmidt. Hata. May.
Leptatherum japonicum, Fr. & Sav. Yokohama. October. (Named by M. Franchet.)
Oplismenus undulatifolius, Rœm & Schult. Not in Franchet and Savatier's "Enumeratio." Yokohama. September.
Phragmites macer, Munro MSS. (n.sp.) Oyama. October. A singular species with small scattered spikelets, and at first sight looking more like a Festucacea.

ON A NEW SPECIES OF *CALORHABDOS*.

By H. F. Hance, Ph.D., Member Imp. Acad. Nat. Cur., etc.

7816 Calorhabdos cauloptera, *sp. nov.*—Glaberrima, erecta, ramosa, foliis membranaceis lanceolatis acuminatis a triente inferiore leviter acute serrulatis subopacis subtus pallidioribus 1½-3 poll. longis sessilibus secus caulem ramosque angulatos in alas integerrimas ¾ lin. latas decurrentibus, racemis caulem ramosque terminantibus densiusculis 3-4 pollicaribus, bracteis linearibus calycem sessilem subæquantibus, calycis 5-fidi lineam longi laciniis falcatis acutis subæqualibus, vel postica reliquis nunc fere duplo minore, corollæ atropurpureæ ad medium 4-lobæ 2-linealis fauce pilosulæ lobis erectis ovato-lanceolatis acutis postico latiore antico lateralibus angustiore, staminum ad basin lobi corollæ superioris adfixorum breviter exsertorum filamentis glabris antherarum loculis parallelis, stylo corollæ æquilongo stigmate inconspicuo, capsula calycem adæquante oblongo-ovoidea turgida parum compressa exalata profunde bisulcata loculicide simulque septicide dehiscente valvis columnam placentiferam nudantibus, seminibus plurimis pallide brunneis ovoideis exalatis.

In provincia Cantonensi, secus fl. Lien chau, 80 mill. pass. ab ejus ostio, in collibus crescentem, invenit am. Rev. J. C. Nevin, m. Octobri, 1876. (Herb. propr. n. 19997).

An interesting accession to the Chinese Flora, nearer the Himalayan *C. Brunoniana*, Benth., than the Japanese *C. axillaris*, Benth!,

which has been gathered by Dr. Shearer and Dr. von Moellendorff at Kiu kiang. It is a coarse-growing plant, with dusky wine-purple flowers, and dries black. As a genus, *Calorhabdos* is not well distinguished from *Veronica*, by its alternate leaves, erect corolla-lobes, and non-capitate stigma, and the two genera are very closely connected by the Siberian *V. tubiflora*, Fisch. !, and the present plant. It seems to me not unlikely that both it and *Pæderota* may ultimately be merged in *Veronica*.

ON THE NATURE OF THE SPERMATIA.

By George Murray,

Department of Botany, British Museum.

The question of the sexuality of the Ascomycetes has lately been brought very much under notice. Researches on the subject have been abundant, and results have been obtained from them inclining their authors, some to advocate the sexuality of this group, and others to strongly deny it. The whole question as to the stability of the present description of the process of sexual reproduction hangs on the function of the spermatia These, it has been contended by some, are the male organs, while others have treated them as asexual, and classed them with conidia. Dr. E. Stahl, in his "Beiträge zur Entwickelungsgeschichte der Flechten" (Heft I.), tells us that the function of the spermatium in the Lichens is, as far as his researches have gone, distinctly sexual. This bears on the question in a very important manner, for in view of the investigations of Schwendener, de Bary, Bornet and others, we must regard the Lichens as Ascomycetes, and, of course, as sharing the fortunes of that group. The spermatia, Dr. Stahl says, must be either parasitic bodies, or conidia (asexual reproductive cells), or sexual organs, and the last-mentioned view as regards the Lichens is upheld by his researches. But let us turn to the experiments of M. Cornu. M. Cornu asserts that by cultivation in nutritive solutions he has succeeded, not only in causing spermatia to germinate (which they might reasonably be expected to do from the analogy of pollen-grains germinating in sugar solutions), but in reproducing Ascomycetes from spermatia alone. So far the results of Dr. Stahl's and M. Cornu's investigations seem very much opposed to each other. We must, however, remember that the nature of Thallophytes is a very simple one, and cases are of very frequent occurrence in which not one, but several parts of the same plant are capable of reproducing it asexually. If, then, spermatia alone are able to reproduce the Ascomycetous plant, are they necessarily to be classed with conidia? May they not be capable of fulfilling the two functions of fertilisation and asexual reproduction, as the microzoospores of *Ulothrix zonata* do in the Algæ? I should hesitate to agree to this, from the comparatively highly developed state of the Ascomycetes, and from other reasons, and would rather adopt the view of Dr. Stahl that they must be the one or the other. At present, so far as I am aware, M. Cornu's experiments have the disadvantage of being unconfirmed by another observer, and it will be seen that from their nature

they are more open to mistake than the more simple observation of the sexual contact of spermatium with trichogyne.

When incidentally examining the thallus of *Collema pulposum*, (Bernh.) Ach., in Scotland this summer, I observed what surprised me, from the clear manner in which it confirmed a small but essential part of the researches of Dr. Stahl. The thallus had been well moistened by several days' rain, and not only it but several neighbouring objects were abundantly covered with spermatia. After much difficulty and several failures, I not only succeeded in finding the spermatia persistently attached to the trichogynes, but in two cases I was fortunate enough to distinctly see the very short connecting tube leading from spermatium to trichogyne. In these cases the axes of the spermatia and trichogynes were parallel, and objects were obtained closely resembling those figured on Taf. II., figs. 3 and 5, of Dr. Stahl's "Beiträge" (Heft I.). Circumstances prevented my being able to follow the subsequent alterations in the trichogyne. The thallus figured by Dr. Stahl to illustrate this point is that of *Collema microphyllum*, Ach., but the process is in both essentially the same. There is thus then, whether the experiments of M. Cornu are right or wrong, sufficient evidence to convince me that a union between spermatium and trichogyne takes place, and if so, the natural inference (supported by the subsequent conduct of the trichogyne) is that that union is sexual.

LIST OF THE PLANTS OBTAINED DURING MR. C. GILES'S TRAVELS IN AUSTRALIA IN 1875 AND 1876.

By Baron Ferd. von Mueller, C.M.G., M.D., Ph.D., F.R.S.

(*Continued from p.* 281.)

Proteaceæ.

Grevillea Huegelii, Meissn. in Lehm. Plant. Preiss. i., 543. Near Ullaring; between Charlotte Waters and Youldeh; var. *simplicifolia*; between Ouldabinna and boundary line; near Victoria Springs.

G. pterosperma, F. v. M. in Trans. Phil. Soc. Vict. i., 22. Between Charlotte Waters and Youldeh; near Mount Churchman; Victoria Springs.

G. Treueriana, F. v. M., Fragm. ix., 123. Between Youldeh and the Elizabeth River.

G. eriostachya, Lindl., Bot. Reg. xxv., App. 36. Near Mount Churchman.

G. eriobotrya, F. v. M., Fragm. x., 44. Near Mount Churchman; between the Alfred-Marie and the Rawlinson Ranges; towards the sources of the Ashburton River.

G. petrophiloides, Meissn., in Lehm. Pl. Preiss. ii., 257. Near Mount Churchman; var. *simplicifolia*; between Victoria Springs and Ullaring.

G. eryngioides, Benth., Fl. Austr. v., 476. Near Mount Churchman.

G. stenobotrya, F. v. M., Fragm. ix., 3. MacDonnell's Range (C. Giles).

G. apiciloba, F. v. M., Fragm. x., 45. Near Mount Churchman.

G. juncifolia, Hooker in Mitch. Trop. Austr., 341. MacDonnell's Range (C. Giles); Victoria Springs; between Youldeh and Ouldabinna.

G. nematophylla, F. v. M., Fragm. i., 136. Between Youldeh and Ouldabinna.

G. paradoxa, F. v. M., Fragm. vi., 246 Between Ullaring and Mount Jackson.

G. Wilsoni, Cunn. in Wils. Voy. 273. Between Ullaring and Mount Jackson.

G. erectiloba, F. v. M., Fragm. x., 44. Between Ullaring and Mount Jackson.

G. erinacea, Meissn. in Hook. Kew Misc. vii., 74. Near Mount Churchman.

G. didymobotrya, Meissn. in Cand. Prodr. xiv., 386. Near Mount Churchman; Ullaring; Victoria Springs.

Hakea trifurcata, R.Br. in Transact. Linn. Soc. x., 183. Near Mount Churchman.

H. multilineata, Meissn. in Lehm. Pl. Preiss. ii., 261. Between Youlda and Ouldabinna; Victoria Springs.

H. incrassata, R.Br., Proteac. Nov., 29. Near Mount Churchman.

H. lorea, R.Br., Prot. Nov., 25. Near Ullaring.

H. platysperma, Hooker, Icon. Plant., t. 433. Near Mount Churchman.

H. cycloptera, R.Br. in Transact. Linn. Soc. x., 182. MacDonnell's Range (C. Giles).

H. Preissii, Meissn. in Lehm. Plant. Preiss. i., 557; var. *foliis trisectis*. Near Ullaring.

Synaphea petiolaris, R.Br. in Transact. Linn. Soc. x., 156. Near Mount Churchman.

Persoonia comata, Meissn. in Hook. Kew Misc. vii., 71. Near Mount Churchman.

P. diadena, F. v. M., Fragm. x., 46. Near Mount Churchman.

Conospermum Stœchadis, Endl. in Annal. des Wien. Mus. ii., 208. Near Mount Churchman.

C. Toddii, F. v. M., Fragm. x., 20. Victoria Springs.

Isopogon divergens, R. Br., Proteac. Nov., 7. Near Mount Churchman.

Petrophila semifurcata, F. v. M. in Benth. Flor. Austral. v., 335. Near Mount Churchman; between Ullaring and Mount Jackson.

Banksia Caleyi, R. Br., Proteac. Nov., 35. Victoria Springs.

Dryandra armata, R.Br. in Transact. Linn. Soc. x., 212; var. *acrolasia*. Near Mount Churchman; between Ullaring and Mount Jackson.

THYMELEÆ.

Pimelea microcephala, R.Br., Prodr., 361. Between Youldeh and the Elizabeth River; Great Bight; North of Fowler's Bay; between Ullaring and Mount Jackson.

P. simplex, F. v. M. in Linnæa xxv., 443. MacDonnell's Range (C. Giles); Youldeh; near Ouldabinna.

P. serpillifolia, R.Br., Prodr., 360. Great Bight.

P. ammocharis, F. v. M. in Hook. Kew Misc. ix., 24. Beyond the Alfred-Marie Ranges.

P. nervosa, Meissn. in Lehm. Pl. Preiss. ii., 269. Victoria Springs.

ARALIACEÆ.

Astrotriche Hamptoni, F. v. M., Fragm. vi., 125, t. lviii. Between the Rivers Ashburton and Gascoyne.

UMBELLIFERÆ.

Didiscus glaucifolius, F. v. M. in Linnæa xxv., 395. Between Youldeh and the Elizabeth River; near Ouldabinna; Lake Eyre (Lewis); MacDonnell's Range (C. Giles).

RUBIACEÆ.

Hedyotis tillæacea, F. v. M., Fragm. iv., 59. Between Youldeh and the Elizabeth River.

Plectronia latifolia, Benth. et Hook., Gen. Pl. ii., 110. Between Ouldabinna and the boundary line.

Pomax umbellata, Solander in Gærtn. Fruct. i., 112. North of Fowler's Bay.

COMPOSITÆ.

Aster axillaris, F. v. M., Fragm. v., 64. Great Bight.

A. Muelleri, Sonder in Schlecht. Linnæa xxv., 459. Between Youldeh and the Elizabeth River; between Victoria Springs and Ullaring; between Youldeh and Ouldabinna; sources of the Ashburton River.

A. subspicatus, F. v. M., Fragm. v., 68. Between Ouldabinna and the boundary line.

A. calcareus, F. v. M., l.c. Between Victoria Springs and the boundary line.

A. pimeloides, A. Cunn. in Cand. Prodr. v., 268. Great Bight.

A. lepidophyllus, Pers., Synops. Plant. ii., 442. Between Charlotte Waters and Youldeh; Victoria Springs.

Epaltes australis, Less. in Schlecht. Linnæa v., 148. Lake Eyre (Lewis).

Calotis cymbacantha, F. v. M. in Schlecht. Linnæa xxv., 400. Between Charlotte Waters and Youldeh; north of Fowler's Bay.

C. hispidula, F. v. M. in Transact. Vict. Inst. i, 130. Between Youldeh and Ouldabinna.

C. plumuligera, F. v. M. in Transact. Vict. Inst. iii., 57. MacDonnell's Range (C. Giles).

Erodiophyllum Elderi, F. v. M., Fragm. ix., 120. Between Youldeh and the Elizabeth River.

Pluchea Eyrea, F. v. M., Rep. on Babb. Plants, 11. Lake Eyre (Lewis); Upper Ashburton River.

Pterigeron dentatifolius, F. v. M., Fragm. ix., 126. MacDonnell's Range (C. Giles).

Minuria Candollei, F. v. M., Fragm. ix., 119. Lake Eyre (Lewis); between Youldeh and the Elizabeth River.

M. leptophylla, De Cand., Prodr. v., 298. Lake Eyre (Lewis); MacDonnell's Range (C. Giles); north of Fowler's Bay; between Youldeh and Ouldabinna.

Podocoma cuneifolia, R.Br., App. to Sturt's Central Austr., 17. MacDonnell's Range (C. Giles).

Vittadinia australis, A. Rich., Botaniq. Voy. de l'Astrolabe, 251. Victoria Springs.

Podolepis Siemssenia, F. v. M. in Benth. Flor. Austr. iii., 606. Between Youldeh and the Elizabeth River; north of Fowler's Bay; Victoria Springs.

Cephalipterum Drummondi, A. Gray in Hook. Kew Misc. iv., 272. Between Ouldabinna and Youldeh; thence towards the Elizabeth River; Great Bight; between Ouldabinna and the boundary line.

Helipterum floribundum, DC., Prodr. vi., 217. Between Youldeh and the Elizabeth River.

H. involucratum, F. v. M., Fragm. iii, 135. Near Ullaring; thence towards Victoria Springs; also between Eucla and Fowler's Bay (Richards).

H. stipitatum, F. v. M. in Benth. Flor. Austr. iii., 643. Between Youldeh and Ouldabinna; thence towards the boundary line; MacDonnell's Range (C. Giles).

H. polygalifolium, Cand. Prodr. vi., 216. Youldeh.

H. Tietkensii, F. v. M., Fragm. viii., 227. Between Youldeh and Ouldabinna.

Helichrysum pterochætum, F. v. M. in Schlecht. Linnæa xxv., 416. North of Fowler's Bay.

H. apiculatum, Cand. Prodr. vi., 195. North of Fowler's Bay; Victoria Springs; var. *Davenportii*, MacDonnell's Range; (C. Giles).

H. Lawrencella, F. v. M. in Benth. Flor. Austr. iii., 618. Youldeh; thence towards Ouldabinna.

H. Cassinianum, Gaud. in Frey. Voy. Bot. 466, t. 87. Between Youldeh and Ouldabinna.

H. Gilesii, F. v. M., Fragm. x., 85. Between the Rivers Ashburton and Gascoyne.

Podatheca angustifolia, Cass. Diction. xxiii., 561. Near Ullaring.

Waitzia corymbosa, Wendl. Collect. Plant. ii., 13, t. 42. Near Ullaring; between Youldeh and Ouldabinna, thence to boundary line.

Chrysocoryne pusilla, Endl. in Bot. Zeit., 1843, 458. Near Mount Churchman.

Angianthus codonopappus, F. v. M., Fragm. ix., 2. Between boundary line and Victoria Springs.

Polycalymma Stuartii, Sond. et Muell. in Linnæa xxv., 494. Between Youldeh and Ouldabinna.

Athrixia chætopoda, F. v. M., Fragm. x., 56. Between Ullaring and Victoria Springs.

Flaveria australasica, Hooker in Mitch. Trop. Austr., 118. Upper Ashburton River.

Senecio odoratus, Hornem. Hort. Bot. Haxn. ii., 809. Between Youldeh and the Elizabeth River.

Sonchus oleraceus, L., Sp. Pl., 794. Near Mount Churchman.

Campanulaceæ.

Wahlenbergia gracilis, A. Cand., Monogr. Campan., 142. MacDonnell's Range (C. Giles); between Youldeh and the Elizabeth River.

Isotoma petræa, F. v. M. in Linnæa xxv., 420. MacDonnell's Range (C. Giles); near Ullaring; between Youldeh and the Elizabeth River.

I. Brownii, G. Don., Dichlam. Plant. iii., 716. Near Mount Churchman.

I. scapigera, G. Don., l.c. Great Bight.

Lobelia rhytidosperma, Benth., Fl. Austr. iv., 126. Near Mount Churchman.

Stylideæ.

Stylidium piliferum, R.B., Prodr., 569. Near Mount Churchman.

S. elongatum, Benth., Fl. Austr. iv., 11; var. *glabricaule*. Near Mount Churchman..

S. limbatum, F. v. M., Fragm. x., 57. Victoria Springs.

Goodeniaceæ.

Goodenia Vilmoriniæ, F. v. M., Fragm. iii., 19. t. 16. Glen of Palms.

G. azurea, F. v. M., Fragm. i., 117. Between the Alfred-Marie and Rawlinson Ranges.

G. Ramelii, F. v. M., Fragm. iii., 20, t. 17. Victoria Springs.

G. Nicholsoni, F. v. M., Fragm. i., 203, t. 4. Glen of Palms.

G. varia, R. Br., Prodr., 576. Great Bight.

G. pinifolia, De Vr. Goodeniar., 157, t. 30. Near Mount Churchman.

G. filiformis, R. Br., Prodr., 578. Between the Alfred-Marie and Rawlinson Ranges.

G gracilis, R. Br., Prodr., 575. Upper Ashburton River.

Velleia cycnopotamica, F. v. M. Fragm., vi., 7, t. 4. Near Ullaring.

V. Daviesii, F. v. M., Fragm. x., 10. Near Ullaring.

V. connata, F. v. M. in Hook. Kew Misc. viii., 162. Victoria Springs.

V. discophora, F. v. M., Fragm. x., 10. Near Ullaring.

Scævola spinescens, R. Br., Prodr., 568. Great Bight; north of Fowler's Bay; between the Elizabeth River and Youldeh, thence towards Ouldabinna; between Yuim and the Gascoyne River.

S. collaris, F. v. M., Rep. on Babb. Plant., 15. Near Ullaring; between Youldeh and Ouldabinna.

S. parvifolia, F. v. M. in Benth. Fl. Austr. iv., 91. Victoria Springs; also on the Thomson River, gathered by Birch. The radical leaves one inch long, oval-lanceolate; var. *brevifolia*.

Leschenaultia heteromera, Benth., Fl. Austr. iv., 43. Victoria Springs.

Dampiera eriocephala, De Vr. Goodeniar. 118, t. 21. Near Ullaring; thence to Mount Jackson. Attains a height of 3 feet.

D. luteiflora, F. v. M., Fragm. x., 11. Near Ullaring.

Brunonia australis, Sm. in Trans. Linn. Soc. x., 367, t. 28. Mac-

Donnell's Range (C. Giles); between Youldeh and the Elizabeth River; between Youldeh and Ouldabinna; between Yuim and the Gascoyne River; north of Fowler's Bay; Great Bight.

GENTIANACEÆ.

Erythræa australis, R. Br., Prodr. 451. Lake Eyre (Lewis).

EPACRIDEÆ.

Styphelia cordifolia, F. v. M., *Leucopogon cordifolius*, Lindl. in Mitch. Three Exped. ii., 122. Between Youldeh and the Elizabeth River.

S. Candolleana, F. v. M., Fragm. vi., 38. Near Mount Churchman.

JASMINEÆ.

Jasminum lineare, R. Br., Prodr., 521. MacDonnell's Range (C. Giles); between the boundary line and Victoria Springs; Upper Ashburton River.

ASCLEPIADEÆ.

Cynanchum floribundum, R. Br., Prodr., 463. Lake Eyre (Lewis).

Sarcostemma australe, R. Br., Prodr. 463. Between the Alfred-Marie and Rawlinson Ranges.

Marsdenia Leichhardtiana, F. v. M., Fragm. v., 160. MacDonnell's Range (C. Giles); Upper Ashburton River; between Youldeh and the Elizabeth River; between Victoria Springs and Ullaring.

APOCYNEÆ.

Alyxia buxifolia, R. Br., Prodr., 470. Between Charlotte Waters and Youldeh; thence towards the Elizabeth River; near Mount Churchman; Ullaring; Victoria Springs; between Youldeh and Ouldabinna.

Notonerium Gossei, Benth. in Hook. Icon. 1180. Musgrave Range.

CONVOLVULACEÆ.

Ipomæa costata, F. v. M. in Benth. Flor. Austr. iv., 419. Between Yuim and the Murchison River.

Convolvulus erubescens, Sims Bot. Mag., t. 1067. MacDonnell's Range (C. Giles); north of Fowler's Bay.

Evolvulus linifolius, L., Sp. Pl., 392. Lake Eyre (Lewis); MacDonnell's Range (C. Giles); between Charlotte Waters and Youldeh.

Breweria rosea, F. v. M., Fragm. i., 233. Victoria Springs.

SOLANACEÆ.

Datura Leichhardtiana, F. v. M. in Transact. Phil. Soc. Vict. i., 20. MacDonnell's Range (C. Giles); Upper Ashburton River.

Nicotiana suaveolens, Lehm. Hist. Nicot., 43. Between the Alfred-Marie and Rawlinson Ranges; between Charlotte Waters and Youldeh; thence towards the Elizabeth River.

Solanum esuriale, Lindl. in Mitch. Three Exped. ii., 43. Lake Eyre (Lewis); between Charlotte Waters and Youldeh; thence towards Ouldabinna and the boundary line.

S. ellipticum, R. Br., Prodr., 446. MacDonnell's Range (C. Giles); between Youldeh and the Elizabeth River.

S. oligacanthum, F. v. M. in Transact. Phil. Soc. Vict. i., 19. Lake Eyre (Lewis); between Youldeh and the Elizabeth River.

Lycium australe, F. v. M. in Transact. Phil. Soc. Vict. i., 20. Great Bight.

Duboisia Hopwoodii, F. v. M., Fragm. x., 20. Near Mount Churchman; Victoria Springs; thence towards Ullaring. The Pitury plant famed as a powerful stimulant among the natives.

Anthocercis Odgersii, F. v. M., Fragm. x., 19. Victoria Springs.

Anthotroche Blackii, F. v. M., Fragm. viii., 232. Victoria Springs.

Scrophularinæ.

Mimulus repens, R. Br., Prodr., 439. Lake Eyre (Lewis).

Stemodia linophylla, F. v. M., Fragm. x., 88. Between the Alfred-Marie Ranges and the Ashburton River.

S. Morgania, F. v. M., Fragm. x., 89. Lake Eyre (Lewis).

Orobanchæ.

Orobanche cernua, Lœfl. Iter. Hispan. 152. Between Youldeh and the Elizabeth River.

Acanthaceæ.

Justicia procumbens, L., Fl. Zeyl. 19. Lake Eyre (Lewis); MacDonnell's Range (C. Giles); between Youldeh and the Elizabeth River; Upper Ashburton River.

(*To be continued.*)

SHORT NOTES.

Shropshire Plants.—I send a specimen of *Scrophularia Ehrharti*, Stev. It occurs in great plenty in a small wood near Cound, about six miles from Shrewsbury, on the Severn Valley Railway, in company with *S. aquatica* and *S. nodosa*, from both of which it differs conspicuously in the broadly winged stem, leafy bracts, and bifid staminode with divaricate lobes. My attention was called to this plant by Mr. W. Beckwith, who is working up the flora of this part of Salop and with whom I visited the habitat to-day. After searching amongst some hundreds of plants of *S. aquatica*, *S. nodosa*, and *S. Ehrharti* growing together we were unable to detect any intermediate forms between these several species. We did indeed find the staminode in some of the plants of *S. aquatica* occasionally showing a tendency towards a depression at the top, but in no case were the bracts so leafy, or the upper part of the stem so winged, as in *S. Ehrharti*. While writing I may mention the occurrence of *Inula Helenium* in the border of a field between Cross Houses and Cound, so remote from the high road and houses that one can have very little doubt as to its being wild. Several of the localities given in Leighton's "Flora of Shropshire" suggest the idea of its being cultivated, such as Alberbury Priory, which I visited last week, and found the specimens on the site of a former garden; but many others forbid such a conclusion, being altogether away from dwellings or roads.—W. Phillips.

Lejeunia ovata, *Tayl.*—In "Journal of Botany" for 1876, p. 198, Dr. Spruce says, "Hitherto known only in the extreme west of Europe, Killarney and the Pyrenees, in both of which stations I have gathered it, as well as in the Quitenian Andes." In May, 1876, I, in company with Messrs. T. A. Scholes and R. Faulkner, collected it sparingly at Tyn-y-groes, near Dolgelly, North Wales, and again in company with C. Wild in April, 1877, abundantly at the same place. —W. H. Pearson.

Guernsey Plants.—*Suæda fruticosa* is recorded as a plentiful inhabitant of the Braye du Valle, Guernsey, by Mr. H. O. Carré in the "Primitiæ Floræ Sarnicæ," but Professor Babington did not succeed in finding it there, and expressed his belief that *S. maritima* was mistaken for it. I send a specimen of *Suæda fruticosa*, which was growing sparingly by the side of S. Sampson's salt-pans in June last, *Polypogon monspeliensis*, Desf., being also very abundant there. I was pleased to find *C. punctata* growing freely in the Grand Mere, Vazon Bay, Guernsey, where, however, it appeared to be confined to a peaty enclosure of about an acre, and was to be found more frequently on the edges of the peat holes; *C. Œderi* and *C. distans* were growing with it. The above is Professor Babington's locality in his "Prim. Fl. Sarn.," but Mr. Watson and Dr. Boswell did not notice the Carex when they searched the Grand Mere.—G. C. Druce.

Northamptonshire Plants.—Between Wittering and Barnack occurs some marshy ground thickly covered with *Menyanthes trifoliata*, L., among which *Parnassia palustris* is also found. Thinly scattered over the marsh *Schœnus nigricans*, L., was growing; this is a totally new county record. The local *Juncus obtusiflorus*, Ehrh., *Triglochin palustre*, L., and *Carex flava*, L., were also seen there. *Eriophorum latifolium*, Hoppe, grew on the Wittering side of the brook, and this is most likely the same locality as that which Rev. M. J. Berkeley records for it. At Foxhall, near Kettering, occurs the almost sole piece of bog in Northants. The following plants not mentioned in "Topographical Botany" I have recently found there; their occurrence might have been almost certainly predicted. *Veronica scutellata*, L., *Blysmus compressus*, Panz., *Carex pulicaris*, L., *C. stellulata*, Good., *C. flava*, L., *Triodia decumbens*, Beauv., and *Molinia cærulea*, Mœnch. The following plants also occur though they are rapidly dying out elsewhere: *Eriophorum angustifolium*, *Pedicularis palustris*, *Anagallis tenella*, *Pinguicula vulgaris* and *Carduus pratensis*. My chief object in making this record is to state that last autumn the bog has been planted with sallows, so that probably this interesting locality will shortly be spoiled. —G. C. Druce.

Anthoxanthum Puelii.—Specimens of this little grass have been sent from the neighbourhood of Kinver, Staffordshire, where it was gathered by Mr. J. F. Thompson, Dr. Fraser, and Mr. Lees. The first-named gentleman has also found it in the parish of Hagley, Worcestershire.

Extracts and Abstracts.

Development of Seed of Orobancheæ.

Ueber die Entwickelung des Samens der Orobanchen. Von Dr. Ludwig Koch. (Pringsheim's Jahrbucher für wissenschaftliche Botanik. Vol. xi., p. 21, with 3 plates.)

The author finds that the ovule of *Orobancheæ* has only one integument. The endosperm is formed by division, the principal development of endosperm lying about in the middle of the embryo-sac. Endosperm-divisions occur also at both the micropylar and chalazal end, but the cells are here arrested in their growth, and in the ripe seed are present only as rudiments; this arrest is most remarkable at the micropylar end. The proembryo (suspensor) advances without undergoing division towards the middle of the embryo-sac; its knob-like extremity divides transversely into two equal cells, the under of which plays the part of a hypophyse, the other becoming the mother-cell of the embryo. The divisions in the upper cell follow the dicotyledonous type as established by Hanstein. The dermatogen divisions begin mostly in the lower quadrants, while there are often irregularities in the upper ones. The inner part of the tissue composing the cotyledonal half of the young embryo remains very simple, is often asymmetrically formed, and does not differentiate into plerome and periblem; while in the radicular half there is only simple inner tissue often irregularly divided. The structure of the embryo of the ripe Orobancheous seed resembles, therefore, that of the immature seed of ordinary Dicotyledons. S. M.

New Saprolegnieæ and Allied Forms.

Beobachtungen über einige neue Saprolegnieæ, über die Parasiten in Deomidienzellen, und über die Stachelkugeln in Achlyaschläuchen. Von P. F. Reinsch. (Pringsheim's Jahrbucher für wissenschaftliche Botanik. Vol. xi., p. 283.)

The author describes two new Saprolegnious genera, one of which (*Nægelia*) grows on stalks of *Viscum* which have long lain in the water of clear shaded ditches, and consists of cylindrical unicellular branched threads narrowed at the place of branching. The young ramuli in this genus are broader and much shorter than the full-grown threads, and they are arranged, each on a short stalk, in whorls much like the stationary gonidia of *Ophiocytium*. Some of these short cells do not elongate, but give origin in their interior, either to a great number of small ellipsoidal cells having a diameter of 0·0056 mm., which escape by means of a small terminal opening; or else to a small number (4-9) of large spherical cells, of 0·0112-0·0168 mm. diameter, which become covered with a thick pale-coloured membrane. The branches containing these large cells usually have a small circular opening at the upper end before formation of the membrane. The

author supposes that the large cells are fertilised by the small ones, and he mentions another and smaller species of the genus which was found growing among unicellular Algæ. The other genus, *Blastocladia* (*B. Pringsheimii*), is found in water containing putrefying apples. It is unicellular, and consists of a tube producing a system of branched rootlets at one end, and at the other a variable number of mostly regularly whorled fertile branches. What the author has little doubt are sporangia and oogonia are developed in the upper half of the secondary (fertile) branches, the former organs being cylindrical, the latter oval. A third supposed reproductive structure, which seems to us even more like some *Chytridioid* growth than the "sporangia" and "oogonia," is long and narrow. A new *Saprolegnia* (*S. siliquæformis*) growing with *Blastocladia* is formed of a certain number of branched chain-like threads. The sporangia are always open at the top, and are included inside older empty ones. The oogonia were not found.

The "stachelkugeln" in *Achlya* (*Oepidiopsis*, Cornu), about the nature of which Cornu—whose monograph in Ann. Sc. Nat. the author appears not to have seen—as well as earlier observers were in doubt, are shown to be oospores resulting from a true act of copulation. This observation is an interesting extension among *Chytridiaceæ* of Nowakowsky's last-year discovery of sexuality in *Polyphagus*.

THE GERMINATION OF THE GENUS MEGARRHIZA, *Tor.* By ASA GRAY. (Silliman's Journal, July, 1877.)

SEEDS of *M. californica* do not remain hypogæan, but come up above the soil raised on what appears to be a well-developed radicle, but which is in reality formed of the united elongated petioles of the cotyledons. The plumule is situated underground, quite at the base of the false radicle, and immediately below the plumule is seen the thickening of the true radicle. After a time the united petioles become separable. Comparison is drawn between this case and other abnormal methods of germination, which seem to us eminently calculated to protect the tender seedlings from browsing enemies.

S. M.

Notices of Books.

Flora of Mauritius and the Seychelles: a Description of the Flowering Plants and Ferns of those Islands. By J. G. BAKER, F.L.S. Published under the authority of the Colonial Government of Mauritius. London: L. Reeve & Co. 1877. (8vo. Pp. 557.)

ANOTHER of the Colonial Floras issued under Government patronage. The plan is that of the Hongkong and Tropical African Floras, and it has been prepared entirely at the Kew Herbarium. The Orchids have been described by Mr. Spencer Moore, and the Palms and *Pandanaceæ* by Dr. I. B. Balfour; the remainder is the work of Mr. Baker. The plants of Rodriguez are included, but not those of the French island of Bourbon.

The author has materially reduced the number of species; according to the present Flora, the native plants are for Mauritius, 869; for Seychelles, 338; for Rodriguez, 202; in all, 1058; of these the large proportion of 122 are here described for the first time. The interesting character of this native vegetation is further shown by the fact that more than half, 536 species, are restricted to the Mascarene (the term is used to include Madagascar, &c.) Archipelago, and perhaps still more by the unusual relative proportion of the Natural Orders. Arranged in the sequence of number of species, the eight largest Orders stand thus: Filices 168 species, Orchideæ 79, Gramineæ 69, Cyperaceæ 62, Rubiaceæ 57, Euphorbiaceæ 45, Compositæ 43, Leguminosæ 41. The low position of the last two is especially worth remark.*

The vegetation is further remarkable for the number of introductions; "introduced trees, shrubs, and weeds have replaced the original vegetation to a greater extent than in any other part of the world except St. Helena." No less than 269 of these are considered sufficiently well established to be described in the present book. There are not a few others not here given which have nearly equal claims, and in many cases it is a matter of great difficulty to arrive at a conclusion on the question of nativity.

In the preface brief indications of the principal books and collections from which the author's knowledge of the botany of Mauritius has been derived are given. He might have advantageously extended his researches. Aublet, the first botanist of ability who investigated Mauritius, where he lived for nine years (1752-61), is unaccountably overlooked; his collections are in the British Museum. Some notice of Boivin, who collected in Mahé and Mauritius in 1845 and subsequent years, might also have been expected. For Rodriguez, Dr. Balfour's collections made in 1874 must very fully represent the flora of this small island; a full account of his gatherings is to be published by the Royal Society.

There are 5 new genera described: *Hornea* (Sapindaceæ) is Mauritian; *Medusagyne* (Ternstrœmiaceæ), from the Seychelles; and *Mathurina* (Turneraceæ)—already published in the Journ. Linn. Soc. xv., p. 159—*Scyphochlamys* (Rubiaceæ) and *Tanulepis* (Asclepiadeæ) are from Rodriguez.

A practice in nomenclature, which, if not new in English books, has, at least, been rarely followed, is here adopted in a few cases. Where several species of previous writers have been combined by the author, he has, instead of conserving the oldest of these names for his aggregate, given it a new name. Examples are to be found in his *Aphloia mauritiana* and *Quivisia mauritiana*. These new specific names appear an unnecessary additional piece of synonymy, and in the cases quoted are not specially appropriate, as in neither are the aggregates to which they refer restricted to the Mauritius.

The appearance of this Flora, which was indeed much wanted,

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* Almost the only Leguminous plant of interest in Mauritius, and the only Mascarene endemic genus found there is *Bremontiera Ammoxylon*, DC., the "Bois de Sable" of Commerson, from whom is a specimen in the British Museum. This species is treated as doubtfully Mauritian by the author, who had not seen a specimen from that island; it is found also in Bourbon.

and cannot fail to be of great service both here and in the colony leads one to think of other colonial Floras, and especially of the unfinished "Flora Capensis," the continuation of which is so urgently desired both by the Cape Government and by botanists in South Africa and at home. It is stated in the preface to the book under notice that the "Flora Capensis" is "intended to be continued by Mr. Thiselton Dyer." We made a similar announcement in these pages some years ago. It is known that some of those who were asked to assist in the work have done their part towards making up a fourth volume, and this, with the help, both scientific and monetary, which the colony has shown itself able and willing to afford, ought to be brought out without further delay. H. T.

A New London Flora; or, Handbook to the Botanical Localities of the Metropolitan Districts. Compiled from the latest authorities and from personal observation. By EYRE CH. DE CRESPIGNY, M.D., M.R.C.S. London: Hardwicke and Bogue. 1877. (12mo, pp. 180.)

IT may be doubted with some show of reason whether the time for publications of this nature has not almost passed away. An enumeration of the vegetable productions of a district, the boundaries of which are determined solely with reference to their distance from some arbitrary centre, however convenient to a resident collector, can have in itself but little scientific value, and is on a par rather with the catalogue of a nurseryman, than with the idea of a Flora as at present understood. In either case we have the interest to be derived from the knowledge that by a visit to a given locality some particular desideratum, whether in the herbarium or the garden, may be supplied; but with this the matter ends. There is no room for any attempt at the correlation of the botany with the geology and physical history of the country, or for the investigation of the origin and limits of the constituent elements of the flora; especially the valuable lessons to be deduced from the absence even more than from the presence of certain plants in the district, and the irregularities of distribution which characterise some of our commoner species, will be wanting. The magnificent "Flora Londinensis" of Curtis * owes its value rather to the accurate and original descriptions of plants to be found within its pages, than to any relation to the neighbourhood of the capital,† a connexion that was indeed soon laid aside in all but in name, and was altogether abandoned by his continuator. Passing by the unfinished "Indigenous Botany" of Milne and Gordon, and the "Botanist's Guide," of Cockfield, we come to the "Flora Metropolitana" of Cooper, a work purely topographical in its scope, and which seems to have furnished the first suggestion of the publication now under consideration. This was immediately followed by the "London Flora" of Irvine, a conspicuous instance of mis-

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* The "Botanicum Londinense, or the London Herbal," of Petiver, commenced in 1710, if ever completed, may perhaps have been the earliest account of the plants about London. (See "Flora of Middlesex," p. 331.)

† Curtis had previously, in 1774, published a "Catalogue of Plants growing Wild in the Environs of London" (ib., p. 394).

applied industry in the absence of critical faculty and accuracy of method. This however extends more or less over the whole of Britain, and is chiefly occupied with descriptive botany and cognate subjects.

Appearing after a considerable interval, and much more restricted in its design, the "New London Flora" is rather an index to the places within a convenient distance of the metropolis, where the "practical student" may obtain any specimen of which he happens to be in need, than an analysis of the botanical geography of the tract of country from which it takes its name. It consists of two principal divisions; the first contains a catalogue of all plants to be found within the prescribed limit,* the second a list of selected localities with the more interesting species to be met with in each of them. "It has not been deemed advisable to look into any 'authority' of earlier date than the New Botanist's Guide," and "all such localities as are in any way doubtful by reason of antiquity" have been omitted, but the pages of Gerard, Ray, and Blackstone † have been freely, though perhaps unconsciously, drawn upon, and at second hand. Nor is the reference to more modern authorities by any means complete; few people would imagine that under the ambiguity of "Hooker: 'Journal of Botany,' &c. (various)" lurked any connexion with our own pages. It is not very easy indeed to understand what were the principles that directed the author in his choice; not only are the reports of ephemeral associations quoted indiscriminately with the writings of the most approved botanists, but the same authorities that are referred to under one species are neglected without any apparent reason under the next, and localities standing on one and the same page have been similarly taken up or omitted at random. It thus happens not unfrequently that records which are absolutely erroneous, or at best of but doubtful or temporary value, have been selected to figure in the "New London Flora;" while some of the most undeniable facts in local botany have been needlessly expunged or branded with an expression of ostentatious incredulity; in many cases (e.g. *Calamagrostis lanceolata*) a visit to either of our great public herbaria would have speedily removed the cherished doubt. We have, therefore, not so much a complete view of the actual state of the flora within a somewhat uncertain radius of the metropolis, as a series of selections taken without any very definite principle from a number of authorities of unequal value, and supplemented by the observations of the author himself.

There is considerable confusion in the arrangement under the various headings,‡ and the all but complete absence of any reference to counties is at times perplexing; indications of this kind when given are not unfrequently erroneous, indeed the results of careless copying are but too obvious throughout this portion of the work. The

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* The precise radius employed seems to be left rather uncertain. The author apologises for the introduction of plants from Southend as beyond the limits of thirty or thirty-five miles.

† The date of this last-named author is, however, given as "A.D. 1800," at p. 135. He died in 1753.

‡ As an instance, under *Vinca minor* localities are given from—Surrey; Essex; Kent; Middlesex; Surrey (2); Essex (2); Surrey (3); Kent (2); Herts; Essex (3); Herts (2); Surrey (4).

nomenclature is that adopted in the last edition of the London Catalogue, which has in one instance been followed even to the imitation of a purely clerical error. *Plantago lacustris* stands as a presumably new species, to which *P. Coronopus* is subsequently referred as a synonym. In some cases errors of diagnosis may be suspected. *Carex curta* does not seem likely to occur in a hedge at Totteridge.* *C. teretiuscula* from the Paddington Canal is perhaps *C. paradoxa*, noticed there by Mr. Warren (Cf. vol. ii., N.S., p. 380). *Crepis paludosa* is very improbably, to say the least of it, plentiful about Woolwich and Erith. *Bromus racemosus* is not usually a plant of "hedgebanks in cool and shady places"; nor is *B. commutatus* to be found in the experience of everyone "in lanes, everywhere." The station quoted for *Fumaria "pallidiflora?"* from the "Flora Hertfordiensis," was subsequently ascertained by Mr. Coleman to belong to *F. micrantha*. *Euphorbia portlandica* in Charlton Wood, derived from old authority through the medium of Cooper, might well have been omitted altogether. Many other statements of an equally doubtful character might be instanced.

This first part of the Flora has besides been made the vehicle for the introduction of various critical remarks, which, in addition to very numerous extracts, are frequently echoes of passages in the writings of Mr. Watson, and have occasionally suffered much in transmission. Other attempts at the imitation of the same characteristic style are even less fortunate. A few instances will suffice. *Callitriche truncata* is apparently massed with *C. hamulata*, and given for Shalford Common; *Hieracium boreale* is stated to be "a mere variety" of *H. umbellatum*, and with it *H. murorum* is "confounded possibly at times;" *Ulex nanus* is an "old name, now applied to the stunted prostrate form in a *specific* sense;" *Viola canina*, which is found "with var. *flavicornis* in similar situations," is a mere variety of the preceding "*V. sylvatica* (olim *canina*)." *V. lactea* is "a variety only of the last" (*canina*). "The student should gather these Dog Violets from various localities and compare them with one another, and with the descriptions in the books." *Potamogeton zosterifolius* is a variety of *P. pusillus*, &c., &c. The terms "incidental" and "obscurity" are hardly an improvement upon Mr. Watson's better-known phraseology, while the application of the frequently recurring "*olim*," and of the very numerous marks of doubt do not appear to rest upon any consistent grounds. There are some very extraordinary remarks upon the "Minor Cryptogams" at page 95. The "acquaintance with the subject" that is "indispensable to the student" has in this case surely heen very "partial" indeed.

The second part of the "Flora" is an amplification of the work of Cooper, and combines a re-examination of the old localities, with the addition of much original matter. It will doubtless be useful to the holiday excursionist of botanical tastes, who will do well to make it his *vade mecum*; but here, too, the absence of arrangement adds much to the difficulty of consulting

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* In the second part, however, this sedge appears to be referred to the neighbourhood of Pinner, while *C. divulsa* takes its place at Totteridge. Cf. pp. 12, 118, 120.

it, as the localities follow one another without any regard to geographical order. The numerous misprints might be advantageously corrected.

R. P.

Pollen. By M. Pakenham Edgeworth, F.L.S., F.A.S. Illustrated with 446 Figures. London: Hardwicke & Bogue. 1877. (8vo. Pp. 92, tab. 24.)

This book contains figures of pollen-grains of 440 species viewed in different media, drawn to scale, and arranged in the sequence of their Natural Orders. The author has endeavoured to avoid giving those previously published by other writers on the subject, and many are no doubt here printed for the first time. Lithographic plates of this kind are not at all suitable for delicate structures, but the present figures appear to be faithful reproductions of the author's drawings. As rough sketches they are good enough, and show coarsely the shape and markings of the objects; and this is all that has been aimed at. An explanation accompanies them, giving the size of each, and short descriptions.

Of the text of the book it is not necessary to say much. There is a short introduction, with very brief allusions to the important memoirs of Purkinje, Naegeli, Luerssen (who are transformed into "Purjinke," "Nagili," and "Luersen"), Frizsche and others; and then follows a list of "plants of which the pollen has been described," those which the author has himself examined being distinguished. This list occupies sixty pages, and there are references to the papers and books consulted; but these have been apparently but few, and the list is very far from being complete; probably any botanist looking through it could at once add many other species. The whole is disfigured by a most unusual number of misprints, many of an extraordinary character ("*Astilbe*" for *Astelia*, "*Anisogeisus*" for *Anigozanthus*, "*Humirium*" for *Homalium* and "*Corispermum*" for *Comesperma* are serious); indeed one can only suppose that the proof-sheets entirely escaped correction.

H. T.

Ferns; British and Foreign. The History, Organography, Classification, and Enumeration of the Species of Garden Ferns; with a treatise on their cultivation. By John Smith, A.L.S., ex-Curator of the Royal Botanic Gardens, Kew. New and enlarged edition. London: Hardwicke & Bogue. 1877. (8vo. Pp. 450.)

The second edition of this well-known and useful manual of cultivated Ferns has been brought up to the present time by the addition of an Appendix containing 226 species, nearly the whole of which have been introduced since 1866, the date of the first edition; and it has also been corrected throughout. Every care seems to have been taken to make the book complete, and it is without doubt the most accurate one of its kind in existence. The author's long experience at Kew, under the late Sir W. J. Hooker, renders his chapter on the cultivation of Ferns authoritative on the subject. As to Mr. Smith's views of classification and the multiplication of genera, though they are opposed to the opinions of our principal pteridologists in this country, they have at all events led to a very full examination of species, and in

the present book—in which each genus has a wood-cut illustration—to a large number of useful figures intercalated with the text. That the author, for ten years past quite blind, and now advanced in years, should have kept up so completely his interest in and knowledge of Ferns is a conspicuous instance of zeal and perseverance.

H. T.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, PLYMOUTH, 1877.

Section D.—Biology.—Department of *Zoology and Botany*.—*August* 17*th*.—J. Gwyn Jeffreys, Esq., F.R.S., President, in the chair.—"On the Roses of the neighbourhood of Plymouth," by T. R. Archer Briggs. This was similar in plan to the paper in this journal (1870, pp. 347-51). Since 1870 further investigation has brought out defects and omissions in that paper, and these are corrected and supplied. The district comprised extends twelve miles round Plymouth, and is divided into six districts founded on the river drainage. The following are the points supplementary to the paper above referred to. *Rosa spinosissima;* a form with the peduncle more or less aciculate; grows about the Erme Estuary, S. Devon. *R. tomentosa*, Sm.; in addition to the typical plant of Smith, we have three of Baker's five varieties, viz., *subglobosa*, *scabriuscula*, and *sylvestris;* whilst under our aggregate *tomentosa* are represented five of Déséglise's species: *tomentosa*, Sm.; *subglobosa*, Sm.; *Andrzeiowskii*, Steven; *fœtida*, Bast.; and *cuspidatoides*, Crépin. M. Déséglise now identifies his former *britannica*, which is the *Jundzilliana* of Baker, with *fœtida*, Bast. As Baker in the "Journ. Linn. Soc." sinks *Jundzilliana* of the "Review" into a variety under *tomentosa*, by making it "essentially the same" as Lindley's *sylvestris*, it is under this variety that *fœtida* must come. It occurs in the parishes of Yealmpton, Brixton, and Newton Ferrers, S. Devon, and at Elmgate, St. Stephens, E. Cornwall. *R. rubiginosa*, Linn.; under this we have two of Déséglise's species, *R. comosa*, Ripart, and *R. rotundifolia*, Rau. The latter appears as quite a sylvestral plant in one or two spots in the Plym Valley. *R. canina*, var *a. lutetiana*, Leman, the typical *canina* of Linnæus, is very common. A Rose gathered at Leigham Egg Buckland, S. Devon, has been labelled *Malmundariensis*, Lejeune, by Déséglise, which is considered by Baker a modification of *lutetiana*. It differs in having leaves somewhat doubly serrated, and sepals glandular at the back. Var. *sphærica*, Gren.; hedge near Kingsmill, E. Cornwall. This is regarded by Déséglise as quite the plant of Grenier. Var. *biserrata*, Merat, *R. vinacea*, Baker, Rev.; hedge at Carkeel, near Botus Fleming, E. Cornwall. Just the *vinacea* of the "Review." Var. *urbica*, Leman; under this we have *R. semiglabra*, Ripart, *R. hemitricha*, Ripart, and *R. platyphylla*, Rau. This last is a very luxuriant form, with remarkably large glaucous leaves, which are slightly doubly serrated, the serratures ending in a peculiarly hard, stiff point; the stipules and bracts fringed with glands; fruit nearly, sometimes quite, globose. Var. *dumetorum*, Thuill.; common and generally distributed. Var. *obtusifolia*, Desv.; rather common. The name has been confirmed by Déséglise with regard

to some examples. Plymouth plants also agree well with Baker and Boreau's descriptions. Var. *Andegavensis*, Bast; hedges at Pennycross, S. Devon. Doubtfully under this M. Déséglise places the *R. Lemeitrei* of Ripart, differing in having glabrous styles, and smaller and doubly serrated leaves. This was found between St. John's and Trelay, E. Cornwall. Var. *verticillacantha*, Merat; under this Baker places two very remarkable Roses of the neighbourhood, both of which are made species by Déséglise, under the respective names of *R. latebrosa* and *R. aspernata*. The descriptions of the latter, founded on Plymouth specimens, are given in Journ. Bot. for June, 1874. *R. latebrosa* occurs in numerous places. *R. aspernata* is rare and local, occurring only about St. Budeaux and Tamerton Foliott, S. Devon, and in two spots near Kingsmill, E. Cornwall. Var. *collina*. Jacq. non Baker; very rare. In a hedge close to the town of Plymouth; probably also near Tamerton Foliott, S. Devon, but some doubt attaches to the plant at the latter place. The Plymouth *collina* of Baker's mono raph is the *R. leucochroa* of the Continental botanist, and not the true *R. collina* of Jacquin. Var. *concinna*, Baker; in two hedges near Honicknowle, S. Devon. Apparently a very uncommon variety everywhere. Var. *coriifolia*; hedge near Lynham, S. Devon. *R. stylosa*, var. *systyla*, Bast. In Journ. Bot., 1870, p. 350, this appeared as the second form under what the author then believed to be *collina*, Jacq., in deference to Mr. Baker's view, but M. Déséglise has since shown him the erroneous nature of this belief by naming specimens collected in various places in Devon and Cornwall "*R. systyla*, Bast.;" and a careful comparison of French specimens of *systyla*, both in flower and fruit, with Plymouth examples has shown unquestionably the identity of the plants. "Var. *leucochroa*, Desv.," Déséglise; this helped to make up the "*collina*" of the former paper. It is very common and universally diffused. Possibly it should stand as a species, and so distinct from *R. systyla*, Bastard. The points of difference between this and all our other Roses are very apparent to the eyes familiar with it. It has its styles nearly or quite glabrous, and in this and other respects differs from specimens of the *collina* of Jacquin, as received from Déséglise.—"On *Lavatera sylvestris* recently found in the Scilly Islands," by Henry Trimen. The author commenced with some account of the British plants forming the "Atlantic" type of Watson, and pointed out that of these only a certain number were "Atlantic" when their extra-British distribution was considered. Of these truly "Atlantic" species there is but a small number in Britain, though Ireland and the Channel Islands add a few more. *Lavatera sylvestris* is a member of this restricted type of distribution, but reasons were given which appeared to be against the probability of Scilly being an outlying native locality, and in favour of recent introduction (see p. 257). Mr. T. R. A. Briggs, who had visited the Scilly Islands this summer, and seen the plant at S. Mary's, stated that he considered it in all probability introduced.—"Notes on Anticipatory Inheritance in Plants, especially with reference to the Embryology of Parasites," by G. S. Boulger. This was designed to call attention to three groups of facts. The first related to the embryology of parasites, epiphytes, saprophytes, and carnivorous plants, which were shown to agree in having fleshy peri-

sperm, and, for the most part, to have reduced cotyledons. The cotyledons are absent in some but not all leafless parasites and saprophytes, the latter class of plants having the most reduced type of embryology on the whole. The second group of facts bore on the form of the young and mature leaves in *Tropæolum* and *Aucuba japonica*, and in seedlings of the latter species, which, in the writer's opinion, suggested that the immature and seedling leaves indicated an ancestral type now abandoned by the plants in favour of more recently acquired forms. The third group treated of the resemblances of detail between the floral organs of certain plants and their leaves, under which head reference was specially made to *Sarracenia*, *Hypericum* and *Dionæa*. The facts, taken together, were held to justify an hypothesis advanced by Mr. Darwin that at whatever period of life a peculiarity first appears it tends to reappear in the offspring at a somewhat earlier age. For this accumulated effect Mr. Boulger proposed the name "anticipatory inheritance." Prof. McNab and Dr. Trimen pointed out some errors of fact, and Prof. Dickson thought that the conclusions of the author were too general.—"On the Movements of Water in Plants," by Prof. W. R. McNab. In some experiments, published some time ago by the Royal Irish Academy, a rapidity of ascent of water in the Xylem of the stem of the Cherry Laurel, equal to 40 inches per hour, was observed. Since the publication of these experiments, numerous other experiments have been performed by Prof. Pfitzer, of Heidelberg, with the view of ascertaining the velocity of ascent of fluid in plants. Pfitzer first experimented by observing how some leaves that had become flaccid from want of water reassumed their normal position. He also tried the Lithium Citrate method, and in a third series combined the two, using the one method as a check on the other. In his experiment with Lithium Citrate Pfitzer has observed the greatest rapidity of ascent yet recorded, the *Helianthus annuus* being found to give a velocity equal to 22 metres per hour, or 13 inches per minute. Professor Pfitzer also describes a new method, to supersede Lithium and the Spectroscope, suggested to him by Prof. Koehne, namely, a solution of soluble indigo-carmine (4 parts to 1000 of water). Experiments made with this solution have been perfectly successful. Hoehnel in his recently published Dissertation, "Ueber den Negativen Druck der Gefässluft," has shown that the air in the vessels of the xylem of rapidly transpiring shoots is in a state of diminished tension, and when such a shoot is cut under mercury, the mercury will rise in the stem from 20-38 cm in a few seconds. From his experiments he concluded that the diminution of the tension of the air in different plants was as follows: *Quercus pedunculata*, 24·5 cm. of mercury; *Æsculus Hippocastanum*, 57 cm. of mercury; *Syringa vulgaris*, 24 cm. of mercury; *Ulmus campestris*, 20 cm. of mercury; *Helianthus*, 46 cm. of mercury. From this it is evident that an important source of error may be introduced into all experiments with Lithium or coloured solutions in cut shoots, as the abnormal current, as Pfitzer calls it, may be more rapid than the normal. Experiment, however, shows that the normal amount is more rapid than the abnormal, due to the diminished tension of the air in the vessel. Hence no error has been introduced into the experiments from this cause.—

"On an abnormal plant of *Primula veris*," by the same. A plant of *Primula veris* was picked in a field on the east side of the Hill of Howth, Co. Dublin, in April, 1877, having in the axil of one of the older and outer leaves a single flower of *P. vulgaris*. The plant had the leaves of the Cowslip as well as two umbels of flowers of *P. veris*, both arising from the axils of the younger or inner leaves. One of the umbels had the flowers expanded, the other only had small buds. The single Primrose flower was in all respects normal, and both it and the Cowslip flowers were macrostylous. In the field along with this abnormal plant both *P. veris* and *P vulgaris* were common, as well as occasional plants of evident hybrid origin. The abnormal plant exhibited was probably a hybrid, showing the return to the parent forms much in the same manner as the well-known *Cytisus Adami*. Mr. Darwin in his last book "on the forms of flowers" mentions the occurrence of such a form as that here described, in cultivated hybrids between the Cowslip and Primrose. It is therefore a matter of much interest to find that similar forms may be produced in a wild state. Mr. Archer Briggs showed a series of somewhat similar hybrids from near Plymouth, and Dr. Trimen mentioned the occurrence of quite the same admixture of the two species in Sussex and elsewhere.

(To be continued.)

Botanical News.

Articles in Journals.—August.

Annales des Sc. Nat. (ser. 6, vol. iv., pt. 2.)—N. Sorokine, "On *Ascomyces polysporus*."—C. Naudin and Radlkofer, "On the influence of changes of climate on plants."—J. Vesque, "On the absorption of water by roots in relation to transpiration" (tab. 5).

Bot. Zeitung.—C. O. Harz, "On the original properties of Spergulin, a new fluorescent body."—P. Ascherson, "*Euchlæna*, Schrad., and *Tripsacum fasciculatum*, Trin."—C. Gobi, "On some *Phæosporæ* of the Baltic and Gulf of Finland."—H. G. Holle, "On the growing-point of the root of Dicotyledons."—A. Morgen, "On the process of assimilation in the germinating Cress (*Lepidium sativum*)."

Flora.—A. Mirks, "On the Lichen-parasite question."—F. Arnold, "Mosses of the French Jura" (contd.).—W. Nylander, "De gonidiis et eorum formis diversis animadversiones."—A. Wigand, "On the horn-prosenchyma."

Hedwigia.—N. Sorokine, "On *Synchytrium punctum*, n.sp."

Oesterr. Bot. Zeitschr.—A. Schweighofer, "On the occurrence of undulate cell-membranes."—L. Menyharth, "The species of *Melilotus* of Waldstein and Kitaibel" (contd.).—F. de Thuemen, "Symbolæ ad floram Mycologicam austriacam" (*Ræsleria*, gen. nov. Helvellac.).—F. Hauck, "Algæ of the Adriatic" (contd.).—S. Schulzer v. Muggenburg, "Mycological Notes" (contd.).—F. Antoine, "Botany of the Vienna Exhibition" (contd.).

Magyar Növénytanilapok.—L. Simkovics, "Botany of Buda-Pesth and its vicinity."—S. Brassai, "Two minute curiosities."—L. Walz, "*Delphinium fissum* near Klausenburg."

Journ. of Linnean Soc. (no. 91, Aug. 21st).—J. G. Baker, "Systema Iridacearum" (contd.).—R. J. Lynch, "Note on the disarticulation of branches" (tab. 3).—G. S. Boulger, "Remarks on the distribution of *Thlaspi perfoliatum* in Britain."—W. Mitten, "List of *Hepaticæ* collected by Rev. A. E. Eaton at the Cape in 1874" (tab. 4, 5).

New Books.—F. Buchenau, "Flora von Bremen" (Muller, Bremen. 5mk.).—T. Heldreich, "Catalogus systematicus herbarii T. G. Orphanidis. Fasc I. *Leguminosæ*" (Florence).—A. Gray, "Darwiniana. Essays and Reviews pertaining to Darwinism" (New York, Appleton).—M. C. Cooke, "Contributions to British Mycology. The Myxomycetes arranged according to Rostafinski's method" (24 plates. London, the Author. 8s.).—U. C. Dutt and G. King, "The Materia Medica of the Hindus, with a Glossary of Indian Plants." (Calcutta).

Prof. Baillon's "Histoire des Plantes" has completed the sixth volume. The last part contains the following Natural Orders:—*Myrtaceæ*, (*Napoleona* and *Punica* included here), *Hypericaceæ*, *Clusiaceæ*, *Lythrarieæ*, *Onagrarieæ* (includes *Trapa*, *Haloragis*, *Gunnera*, *Hippuris*), and *Balanophoraceæ*. The magnificent "Dictionnaire" of the same author has now reached its sixth part, and bids fair to be one of the most useful botanical books ever published.

A paper by F. Luhn in the Journal of the Hessian Natural History Society for 1877, "On the discrimination of the seeds of weeds," is illustrated by ninety-three figures beautifully drawn by Schmidt, with his usual accuracy.

Liversidgea is a genus of fossil fruit, named by Baron von. Mueller in honour of the discoverer, Prof. Liversidge, of the University of Sydney, and described and figured in the Proceedings of the Royal Society of New South Wales. The fruits were found in a silicious deposit from the Richmond River; the systematic position of the genus cannot be determined from existing material.

A magnificent book is in course of publication at Manilla; a new edition of Blanco's "Flora de Filipinas" in folio, with coloured plates. Blanco was an Augustinian Monk, and the present work is issued at the cost of that order at Manilla. It will include, besides all Blanco's material, also the MSS. of Mercado, which formed the foundation of the original Flora, and which have been lately discovered, and those of Llanos, the editor of the second edition published (after Blanco's death) in 1845. Also it is intended to bring up the whole to the present time, and to determine the doubtful species. The scientific director of the work is Father F. A. Llanos, and the editor Sr. D. Vidal y Soler. In connection with this the Spanish Government is organising a botanical exploration of the Philippines, to be conducted by Sr. S. Vidal, Director of the Manilla Botanical Gardens, who is now in London examining the Philippine Islands plants in our herbaria.

The species of chief botanical interest described and figured in parts 17 to 25 of Bentley and Trimen's "Medicinal Plants," of which 183 plates are now published, are:—*Acacia Senegal*, *Toddalia aculeata*, *Soymida febrifuga*, *Piper angustifolium*, *Gelsemium nitidum*, *Simarouba amara*, *Boswellia Carterii*, *Ferula Sumbul*, *F. Scorodosma*, *Sambucus canadensis*, *Plantago Ispaghula*, *Arachis hypogæa*, *Toluifera Balsamum*, *Rheum palmatum*, *Peumus Boldus*, *Euphorbia resinifera*, *Hydrastis canadensis*, *Calotropis procera*, *Alstonia scholaris*. Some of these have not been previously figured, and others only imperfectly.

The medical schools of London re-open on October 1st. The Lecturers on Botany at these various institutions are the following:—St. Bartholomew's, Rev. G. Henslow; Charing Cross, Mr. Saunders; St. George's, Dr. Whipham; Guy's, Mr. Bettany; King's College, Prof. Bentley; London, Mr. J. G. Baker; St. Mary's, Mr. F. A. Hanbury; Middlesex, Mr. Hensman; St. Thomas', Mr. A. W. Bennett; University, Prof. Oliver; Westminster, Mr. Worsley-Benison.

The Fungological Meetings of the Woolhope Club take place at Hereford on October 1st and subsequent days, and the Cryptogamic Society of Scotland hold their third annual conference at Dunkeld on October 17th to 19th. This latter society is now prepared to issue a first century of "Fungi scotici exsiccati," to contain many of the novelties and rarities recently discovered, at a subscription price of £1 1s.

European botany has sustained another severe loss by the death of Filippo Parlatore, which occurred at Florence, where he was professor, on 9th September. He was a native of Palermo, where he was born 8th August, 1816, and was therefore only sixty-one at the time of his death; but for many years past Professor Parlatore had suffered from illness, and at the time of the Congress at Florence, in May, 1874, was unfortunately prevented from taking an active part in its proceedings. His name will always be inseparably connected with the Royal Herbarium at Florence, which he may be said to have created. It was at his urgent representations that in 1842 Leopold II., the then Grand Duke of Tuscany, founded a national herbarium, and at the same time revived the Chair of Botany at Florence, which had been suppressed since 1814, and nominated Parlatore Professor, giving him also the directorship of the garden, then a very small affair. Under energetic management and devoted attention, in a few years the herbarium took rank among those of note, and the gift of Webb's fine collection in 1850 rendered it one of the first rank. As an author Parlatore will be best known by his elaborate "Flora Italiana," commenced in 1848, and unfortunately left far from completion; and his monographs of the *Coniferæ* and *Gnetaceæ*, in the sixteenth volume of De Candolle's "Prodromus"; but he was the author of many memoirs and systematic papers. His early writings were chiefly on Sicilian plants, and in 1844 he commenced a "Flora Palermitana," which was never completed. In this year he also published a monograph of the genus *Fumaria*, and a memoir on the anatomy of *Aldrovanda*. His account of the Sicilian *Papyrus* appeared first in 1852, and the fine volume on the species of cotton was published in 1866. Personally Prof. Parlatore was possessed of a singularly amiable and simple character, and will be universally regretted.

Original Articles.

ALEXANDER BRAUN.

[We are greatly indebted to Professor Robert Caspary, of Königsberg, the son-in-law of the late Professor Braun, for the opportunity of publishing the following details. In response to the request that he would undertake to write an obituary notice, he very kindly sent an extended memoir, full of interesting family and scientific information relating to the deceased Berlin professor. Our space would not have permitted us to translate nearly the whole of this, and we have therefore extracted what we considered of chief importance, and now print it, after having submitted it to Professor Caspary's revision. The obituary in full will be found in the numbers of the Regensburg "Flora" for October.—Ed. *Journ. Bot.*]

Alexander Braun was born on the 10th of May, 1805, in the old town of Regensburg. His father was then in the postal service of Saxony; but, on receiving a higher position in that of Baden, he afterwards lived sometimes in Freiburg and sometimes at his house in Carlsruhe. He was himself fond of science, and studied mineralogy, physics, and astronomy. His wife, the mother of A. Braun, was the daughter of a clergyman named Mayer; a gifted woman, and a friend of Jean Paul.

Alexander owed much to the influence of both his parents, who, when he was quite young, endeavoured to cultivate his taste for the study of natural science, especially botany. In the herbarium he has left are to be found plants collected in his sixth year. The influence of F. A. Ecker, Professor of Surgery in Freiburg, was also valuable. He took the boy with him in his wanderings in the Black Forest and to the Kaiserstuhl, and they collected everything that came in their way—plants, butterflies, beetles, and minerals.

Having been prepared by private teaching, the boy was sent in his eleventh year to the Lyceum at Carlsruhe. For the higher classes of this institution, the teacher of Natural History was then Karl Christian Gmelin, known by his "Flora Badensis" (1805-1826), who was also Director of the Natural History Collection at Carlsruhe. His teaching was in the dry Linnean manner, and not exciting, but at the same time he encouraged Braun's thirst for botanical knowledge by lending him from his library such books as Dillenius' "Historia Muscorum" and Sowerby's "English Botany," and by other kindly acts as occasion offered. So energetically did the boy apply himself to Botany that by his fourteenth year he had become well acquainted with Phanerogams, and turned to the Mosses, Lichens, and Fungi, which he studied with a small Nurnberg microscope. When he failed in determining any thing by means of this, he was very kindly assisted by Märklin, an apothecary in Wiesloch, who had a good knowledge of cryptogams; for Mosses he applied to Bruch, an apothecary in Zweibrucken. Märklin

also put him in communication with other botanists; for instance, with Döllinger, Professor of Anatomy in Munich, who, being specially fond of Mosses, began to exchange with him. While still at the Lyceum Braun contributed several articles to the Regensburg "Flora." His first paper was entitled, "Bemerkungen über einige Lebermoose" ("Flora," 28th December, 1821, no. 48). This was when he was sixteen and a half years of age. Then there followed ("Flora," 1822, 28th November, no. 44) an article on *Oxalis corniculata* and *stricta*. In 1823 he went to the Italian Alps (the Splügen) with his uncle, F. Mayer, who has described the journey in "Flora" for 1823, p. 49. On this occasion *Arundo Plinii Turræ* was collected for the first time in Switzerland ("Flora," 1823, p. 177), and Braun at the same time found *Prenanthes chondrilloides*, also a species new to that country. In 1824 he contributed an article on the plants of Baden ("Flora," 1824, p. 108), and one on the *Polygona* belonging to the section *Persicaria* found about Carlsruhe ("Flora," 1824, p. 353). Besides this, he wrote for the "Sylloge" (1827, p. 81) "Observationes quædam in *Elatines* species."

There has probably never been a botanist who while a schoolboy contributed so much to scientific literature, and with such success as to merit the public praise which was awarded to Braun by Dr. Hoppe, then editor of "Flora" (see "Flora," 1821, p. 954). During his many excursions Braun had materially increased his knowledge of the Baden Flora, and found many plants either new or thought to be so; which Gmelin or Spenner named after him; for example, *Chara Braunii*, Gmel.; *Polygonum Braunii*, Gmel.; *Aspidium Braunii*, Spenn.

In September, 1824, he entered the University of Heidelberg, and began the study of medicine along with that of natural science, in accordance with his father's wish that he should have some professional means of living. Botany, however, was his chief occupation, the works which attracted him most being those of Röper, "Ueber die Bluthenstände" ("Linnæa," 1826, p. 433), and A. P. De Candolle "Organographie Végétale," 1827. Disliking the idle life of his fellow students, he kept at first aloof at his scientific work, but gradually made the acquaintance of several who shared with him a strong liking for natural science, among them being George Engelmann, of Frankfort-on-Main, afterwards a physician at St. Louis, with whom Braun was on terms of friendship and scientific intercourse to the end of his life, Louis Agassiz, from Orbe, Canton Waadt, and Carl Schimper.

In 1827 Braun and Agassiz went to the University of Munich, chiefly to hear the lectures of Oken and Schelling, whither they persuaded Schimper in 1828 to follow. Braun's chief work during his stay in Munich was independent botanical investigation, especially in morphology, to which he was led by Schimper with whom he worked. His researches on Leaf-insertion commenced at this period.

The desire of his father that he should settled down to some fixed occupation led him to obtain, in September, 1829, a degree *in absentia*, at Tübingen, in the Philosophical Faculty,* on the presentation of a thesis

* He was afterwards, on 13th June, 1862, made a Doctor of Medicine by the University of Rostock.

on *Orobanche*, which, with his consent, W. D. F. Koch incorporated into Röhling's "Deutschland's Flora," 1833 (Bd. iv., 428). At this time Braun and Schimper visited the *Naturforscherversammlung* in Heidelberg, where he read a paper on Leaf-insertion, and made the acquaintance of Professor Nees von Esenbeck. In 1831 he published in the "Nova Acta" (tom. xv., 195) his first work of any size. "Vergleichende Untersuchung über die Ordnung der Schuppen an den Tannenzapfen als Einleitung zur Untersuchung der Blattstellung uberhaupt." This work is the basis of the Braun-Schimper doctrine of Leaf-insertion well-known to botanists; it is much to be regretted Braun did not continue to work out this subject. After completing his studies in Munich, and after a short stay with his parents in Carlsruhe, Braun and his brother Max, in January, 1832, followed Agassiz to Paris, where, as in Munich, numerous students of Natural History gathered round them. He here studied diligently Perrottet's collection of plants from Senegambia and the East Indies, and heard the lectures of such men as Mirbel, Adolph Brongniart, Cuvier (who died while Braun was there), and others. He made the acquaintance of Adrien de Jussieu, Alex. Brongniart, Turpin, Decaisne, and particularly Jacques Gay. After a journey into Normandy he returned in September, 1832 to Carlsruhe, where he was appointed teacher of Botany and Zoology in the newly-founded polytechnic school. He soon obtained the title of Professor, and in 1837, on Gmelin's death, became Director of the Natural History Museum, in which he had been assistant for some time previously. He received a call to Zurich also about the same time, but it was declined, and to increase his income he became librarian in the Royal Library in 1838. In his capacity of Professor in Carlsruhe, from the end of 1832 to May, 1846, he gained the attachment of his students, with whom he was in the habit of making frequent excursions.

In April 1835, he married Mathilde Zimmer, an intimate friend of his sister Emy who was engaged to Carl Schimper. Agassiz married another sister, Cecilia, in 1834. Braun's wife died in 1843, leaving him with five young children; and, to add to his grief, he, about the same time, lost both parents.

In the summer of 1844, Braun's children found a second mother in Adele Messmer, a Swiss, who had been teacher to the two eldest, and who, after proving his amiable and accomplished wife, still survives. By his second marriage Braun had five children, two sons and three daughters.

In spite of these domestic events and troubles, Braun found time to write during this period (1832-1846) many valuable papers on the *Characeæ*, *Equisetaceæ*, *Marsileaceæ*, *Isoetes*, and *Ophioglosseæ*, by which his name became well known. These were chiefly published in the "Flora," but some appeared in the "Linnæa," the "Annales des Sciences Naturelles," and "Silliman's American Journal."* He also contributed to the "Flora" notes on *Silene* and other flowering plants, and an account, in 1841, of some of Schimper's Abyssinian

* In view of the list of A. Braun's published memoirs given in the Royal Society's "Catalogue of Scientific Papers" (vol. i., pp. 582–5,) it has not been thought necessary to repeat here special titles and references.

collections; and he enriched the list of Baden plants considerably in his numerous excursions, his material being afterwards incorporated in Döll's "Flora von Baden" (1857-62). At the annual meetings of German naturalists, Braun found time each year to prepare and deliver addresses and papers, chiefly on morphological subjects, many of which were published. During this period, through some unfortunate misunderstandings, his friendship with Schimper became gradually weakened, and was at last broken off, and the latter's engagement to Emy Braun was dissolved. Agassiz also had a little before quarrelled with Schimper. After some years, however, friendly relations were renewed between Braun and Schimper, and they were on terms of scientific friendship till the latter's death, in 1867. At Carlsruhe Braun also devoted some time to the study of the fossils of the Mayence Basin and other districts, and published on the Tertiary plants of Oeningen in 1845; the illustrations of these, drawn by his sister Cecilia, are still unpublished.

In 1845, on the death of Perleb, Braun accepted a call to Freiburg, where he worked for four and half years. There he began the study of Algæ, which proved of great general benefit to this branch of botany. In 1848, during the Baden revolution, Braun played an important part in quieting the disaffected students, many of whom took an active part in the revolution; his duties often led to patrolling the streets at night to prevent disturbance. This having passed over, he again settled down to his usual work, and further memoirs on *Characeæ* and *Isoetes* appeared in 1847-49 in the "Flora" and Hooker's "Journal of Botany." He also continued his communications to the meetings of naturalists.

His well-known book "Betrachtungen über die Erscheinung der Verjüngung in der Natur" was published at Leipzig, in 1851, and was translated into English by Henfrey, under the title of "The Phenomenon of Rejuvenescence in Nature," and published by the Royal Society in 1853. This contained many new facts in morphology, particularly with reference to Algæ.

In October, 1850, Braun received calls to the Universities of Giessen, Erlangen, and Marburg. Liebig, who came himself from Giessen, finally persuaded him to accept the Professorship of Botany there. Braun had been there, however, only half a year when a call reached him from Berlin to the Professorship of Botany and Directorship of the Herbarium and Botanic Gardens, vacated by Link. After much deliberation, persuaded by the eminent geologist, Leopold von Buch, he accepted it, and went to Berlin in May, 1851. He began lecturing four days after his arrival, and from that time continued to work for twenty-six years (fifty-two sessions). In the proper organisation of the Botanic Gardens Braun at first encountered much difficulty, which was increased by the low state of the National Exchequer, and consequent poverty of the grants for such purposes. Similar difficulties stood in the way of the organisation of the herbarium, and the unfaithful conduct of an official of the gardens delayed much the carrying out of the plans of the Professor. The correct naming and cultivation of the plants in the Gardens received his special attention, in particular the *Selaginellæ*, *Isoetes*, and *Marsiliaceæ*, on which he published several further papers

in the "Abhandlungen" and "Monatsberichte" of the Berlin Academy. Of this body he was elected a member on June 19th, 1851, and his first paper was read 17th May, 1852. The *Characeæ* of various parts of the globe continued to occupy his attention to the end of his life, and his last work was a monograph of the Silesian species for the "Kryptogamen Flora von Schlesien," 1877.* The "Characeæ Europææ exsiccatæ" of Braun, Rabenhorst, and Stitzenberger were issued (fasc. 1 to 4) from 1867 to 1870, and the "Conspectus Charac. Europ." appeared in 1867. During these years a large number of memoirs on *Selaginella*, *Isoetes*, *Marsilea*, and *Pilularia* from various countries were published in the "Monatsber. der Berlin Akad." and the "Linnæa." Braun also read several papers at the meetings of the Gesellschaft Naturforschender Freunde on new Cycadeæ and on the question of the gymnospermy of these plants.

The famous work "Das Individuum der Pflanze in seinem verhältnisse zur Species, Generationsfolge, Generationswechsel und Generationstheilung der Pflanze" was printed in the "Abhandlungen" of the Berlin Academy for 1853. Other important memoirs are "Ueber den schiefen Verlauf der Holzfäser und die dadurch bedingte Drehung der Stämme" (Monatsbericht der Berlin Akad., August, 1854) and "De Algis unicellularibus nonnullis novis vel minus cognitis præmissis observationibus de Algis unicellularibus in genere," published at Berlin in 1855.

In the same year followed papers on *Chytridium* and allied genera and on *Pleurocladia lacustris*, and in 1857 the important researches on Parthenogenesis. In these *Cœlebogyne ilicifolia*, J. Smith, and *Chara crinita* were the plants chiefly referred to. Karsten at this time, who also studied *Cœlebogyne*, attempted to show that Parthenogenesis did not occur. Braun never accepted this, and in 1864, at his instigation, Hanstein commenced to work at the subject, and as a result we find him asserting (Bot. Abhandl., 1877) that Parthenogenesis undoubtedly occurs in the plant in question. The investigations of De Bary on *Chara crinita* (Bot. Zeit. 1859, 379), and of Pringsheim on *Saprolegnieæ* also fully bear out the views of Braun. The peculiarities of *Cœlebogyne* were further treated of by him in a subsequent paper in 1859.

In the various scientific societies to which he belonged Braun took a leading part, and rarely allowed a session to pass without presenting some paper in which solid work was embodied. The Leopold-Carolinian Academy, which had elected him a member in 1853, received much of his attention, and it was chiefly through him that the disputes which had arisen in it were quieted, and much needed reforms instituted. He directed his attention not only to botanical questions, but also to general subjects. For instance, we find him lecturing on "Right and Left" in the *Singakademie* of Berlin. When he became Rector of the Berlin University and Teacher in the Friedrich-Wilhelm Institution, he delivered several speeches of special interest, treating of the general comprehension of Nature, of organisms, of the relation of Nature to Spirit, and of his own views on Darwinism.

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* See p. 248 of this volume for a short notice of this.

In his youth Braun had listened to the lectures of Schelling, and from the clearness with which he treats philosophical questions it is evident that he derived much benefit from such theoretical studies. In later times he adopted in some respects the Darwinian theory of evolution. His later works, in particular the "Bedeutung der Morphologie," contain his views on these points stated at length, and with much clearness.

In his University lectures he treated of the whole range of Botany, the subject being profusely illustrated with specimens and excellent diagrams. In the excursions with the students he took a very active part. Walking at a rapid pace with his eyes always on the ground, little escaped his notice, and every object of interest was gathered and explained to the students. In order to collect *Charas* and other water plants, he would even strip himself and enter the water.

There is left behind him a great mass of unpublished writings and drawings arranged in perfect order, and it is much to be regretted that more of it was not given to the world. Many applied to him for advice on scientific matters, and this was always given. In his later years his daughter Cecilia (widow of Prof. Mettenius) answered, under his direction, most of his letters. The influence of Braun on many contemporary scientific works was very beneficial. One in particular must be mentioned, Ascherson's "Flora der Provinz Brandenburg." The natural system of Braun, of which Hanstein has issued a small "Outline," was here first published.

In his private and public life alike Braun preserved a most amiable disposition. Much of his work was done in the presence of his children playing aronnd him, and the delight he showed in all objects of interest was very pleasing to his companions. By his amiability he attracted and retained the friendship and respect of his colleagues and students, by whom in his later years he was honoured by several festivals in commemoration of birthdays and other anniversaries

In the end of March, 1877, he caught a severe cold, which was soon followed by fever, accompanied by rheumatic pains in the breast and left side; and, though at first hope was entertained by his physicians, Braun felt that his end was near. He died early in the morning of 29th March, after much suffering. He leaves behind him his widow, five daughters, and a son of eighteen. The eldest daughter, Marie, is married to Prof. Caspary, of Königsberg*; the second, Cecilia, to Prof. Mettenius (who died of the cholera in 1866 in Leipsic); the third daughter to Nicolaus Eichhorn, a technical chemist. His younger brother, Max Braun, is still alive. His two sons by his first marriage and a daughter by his second died young.

The genus of Mosses, *Braunia*, was so named by W. Ph. Schimper in honour of Braun.† Professor Schimper communicates the following notes upon it:—

"I founded the genus *Braunia* on *Schistidium nudum*, Schleicher

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* Since the above was written, this lady has died on August 29th.

† This must not be confounded with the Menispermaceous genus *Braunea*, Willd. sp. iv., 797 (1805), named after a physician in Salzburg.

(afterwards published with fructification by De Notaris, as *Anœctangium* (v. *Hedwigia*) *sciuroides*); on an American species, *Anœctangium secundum*, Hook.; and on a third species sent by W. Schimper from the interior of Abyssinia (*Braunia Schimperi*). I have figured the European species as accurately as possible in the "Bryologia Europea." A fourth species was found by Perottet in the Neilgherries, at first confounded by Montagne in his "Sylloge" with *Braunia secunda*, and afterwards named by F. Müller *Neckera macroptera*. A fifth species, *Br. Liebmanni* mihi, was brought from Mexico by Liebmann. A sixth, *Br. canescens* mihi, by Mandon from the Peruvian Cordilleras. A seventh, found by Bolander in California, is described by Lesquereux in the Transact. Americ. Philosoph. Soc. xiii. as *Br. californica*, and by Mitten in Proceed. Linn. Soc., 1864, as *Hedwigia pilifera*, and it is, perhaps, rather a long-stalked *Hedwigia* than a *Braunia*. On the other hand, *Anœctangium* (*Harrisonia*, Hampe) *Drummondii*, Tayl., seems to belong to *Braunia*. From the Cape of Good Hope Breutel has brought with him a sterile *Braunia*, which seems different to the Abyssinian one, and which I have named *Braunia Breutelii*. The genus *Braunia* consists, therefore, of eight species (not including *Br. californica* which seems not to belong to it), and, like the name of Alex. Braun, is foreign to no quarter of the world."

The herbarium of Alexander Braun, which is very comprehensive and well-arranged, contains the types of all his species, and many unique specimens, forty-three bundles of a morphological collection, and twenty-six bundles of *Characeæ*, the most complete existing collection of this family. This herbarium, together with other collections of fruits, woods, fossil plants, the above-mentioned valuable collection of his manuscripts, and his excellent library, are offered for sale to the Prussian Government. The Berlin Academy of Science supports its purchase by the State, and it is to be hoped that the Minister of Education will gain this valuable collection for the Royal Herbarium in Berlin, and so ensure its public utility.

The portrait accompanying this brief obituary is from a photograph by Loescher and Petsch, of Berlin.

COROLLA PIERREANA;

SIVE STIRPIUM CAMBODIANARUM A CL. L. PIERRE, HORTI BOT. SAIGONENSIS PRÆPOSITO, LECTARUM ECLOGÆ;

AUCTORE H. F. HANCE, PH.D.

PUGILLUS ALTER, DECADES QUINQUE COMPLECTENS.*

CERTIOR factus a clar. Pierre se in patriam brevi remeaturum esse, periculum a me olim haud absque hæsitatione susceptum, hodie nec invitus remitto. In centris enim scientiarum quæ mox petere expectat vir optimus, ad accuratius investigandas gazas a se summo labore miraque industria conlatas, quarumque exiguam quidem particulam

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* For "Pugillus primus," see Journ. Bot., 1876, pp. 240-44, 257-262.

illustrare conatus sum, literariam inveniet supellectilem speciminumque exsiccatorum copiam quæ mihi in remotis hisce barbarisque litoribus ægre degenti omnino defuerunt. Nec dubito quin enumerationem plenam et criticam stirpium a se in Cambodia et Cochinchina inferiore observatarum cum novarum omnium diagnosibus in lucem proferet versatissimus amicus. Quæ ego potui, multis subsidiis egens, diligenter feci; jamque, negotium deponens, excellentissimo viro pro sua erga me benivolentia denuo quam maximas ago gratias.

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1. Unona (*Desmos*) velutina, *sp. nov.*—Ramulis ferrugineo-tomentosis, foliis coriaceis ovali-oblongis basi rotundatis apice acutis præter costam ferrugineo-tomentosam supra glaberrimis lucidulis subtus glaucescentibus fulvo-tomentosis $3\frac{1}{2}$ poll. longis 1-$1\frac{1}{4}$ poll. latis petiolo bilineali, pedunculo extra-axillari unifloro cum calyce fulvo-tomentoso pollicari, flore cernuo, sepalis ovato-lanceolatis 3 lin. longis, petalis oblongo-lanceolatis obtusiusculis 5-nerviis adpresse sericeo-tomentosis exterioribus $1\frac{1}{2}$ poll. longis 6 lin. latis interioribus 15 lin. longis 3 lin. latis, carpellis . . .?

In summo monte Kwang Repen, prov. Tpong. (Apr. 1870. Pierre, n. 638). Affinis *U. Desmo*, Dun., et *U. Lawi*, Hook. f. et Th.

2. Melodorum (*Kentia*) clavipes, *sp. nov.*—Ramulis glaberrimis nigricantibus rugulosis, foliis oblongo-lanceolatis acumine obtuso membranaceis glaberrimis subtus glaucescentibus venis tenuibus utrinque modice elevatis 2-$3\frac{1}{2}$ poll. longis 1-$1\frac{1}{4}$ poll. latis petiolo 2-$2\frac{1}{2}$ lin. longo, floribus axillaribus solitariis cernuis in albastro depresso-globosis pedunculo 10-lineali sursum sensim incrassato fultis, sepalis latissime ovatis acutis ad medium fere connatis glaberrimis persistentibus, petalis minute et pallide pubescentibus exterioribus e basi lata ovatis acutis 7 lin. longis parte latiori 5 lin. latis crassis intus supra medium carinatis interioribus crassissimis ovatis apice fornicatis medio excavatis quasi cymbiformibus 4 lin. longis, staminibus connectivo truncato plano (*Polyalthiæ*) coronatis, ovariis flaventi-tomentosis stylo oblongo triplo longioribus.

Folia iis *Polyalthiæ glaucæ*. Benth. et Hook. fil. similia. Proximum *M. pisocarpo*, Hook. f. et Th. !. et *M. Leichhardtii*, Benth. ! A *M. Kentii*, Hook. f. et Th. !, alabastris depresso-globosis diversum.

3. Xylopia (*Euxylopia*) Pierrei, *sp nov.*—Ramulis longitudinaliter rugulosis nigricantibus lenticellatis glaberrimis, foliis membranaceis ovali-oblongis obtusis glaberrimis supra lucidulis subtus opacis rufescentibus v. glaucescentibus nervis venulisque similibus inconspicue reticulatis 2-3 poll. longis 9-12 lin. latis, petiolo bilineali, pedunculis paulo supra axillas ortis 1-3 floris 2-4 lin. longis, floribus cernuis, sepalis fere ad medium coalitis orbiculatis acutiusculis sericeis lineam longis, petalis utrinque cano-sericeis exterioribus e basi latiore oblongis apice incrassatis obtusis intus carinatis 3 lin. longis lineam latis interioribus trigono-linearibus e basi concava tenui incrassatis ad medium usque excavatis acutiusculis $2\frac{1}{2}$ lin. longis $\frac{1}{2}$ lin. latis, ovariis 2-3 cano-tomentosis.

Affinis *X. dicarpæ*, Hook. f. et Th., et *X. ellipticæ*, Maing.

4. *Ternstroemia japonica*, Thunb.

5. *Saurauja tristyla*, DC. In montibus Cheren, prov. Sam rong tong. Apr., 1870. (Pierre, n. 572.)

6. *Garcinia* (*Hebradendron*) *Morella*, Desr.—In prov. Tay minh. Apr., 1868. "Arbor 10-metralis, cortice purganti. Stamina 14-18." Ab hac amic. Pierre in sched. discriminavit *G. ellipticam*, Wall. (adspectu omnino similem) ob flores staminibus ultra 40 præditos. Cel. Planchon et Triana. (Ann. sc. nat. 4e sér. xiv., 351.) *G. Morellæ*, adscribunt stamina "numero varia, 14-15 in specimine Walkeriano," sed Hookerus fil. *G. ellipticam*, sine dubio *G. Morellæ* subjungit.

7. *Garcinia Xanthochymus*, Hook. fil.—In planitie Thu duc, Cochinchinæ, Feb., 1871. "Arbor 4-10 metralis." (Pierre, n. 773.)

8. *Calophyllum lanigerum*, Miq.? (ex sententia cl. Pierre).—Ad montes Pra, prov. Sam rong tong. Martio, 1870. "Arbor 10-20 metralis." (Pierre, n. 779.)

9. Hopea dealbata, *sp. nov.*—Ramulis subcompressis purpureo-brunneis glabris, foliis coriaceis oblongis basi rotundatis v. subcuneatis apice ecaudatis obtusis supra glaberrimis sublucidis costa impressa subtus tomento brevissimo leproso denso sordide albido obtecto costa prominente costulis tenuibus in utroque latere 15 prominulis sub angulo 45° egressis venulis transversis reticulatis 3-6 poll. longis 12-21 lin. latis petiolo 5-6 lineali valido quasi suberoso-rugoso supra canaliculato rimulis transversis notato, paniculis cinereo-stellato-tomentosis folio æquilongis, fructibus brevissime pedicellatis, nuce ovoidea resinam luteam exsudante vittis purpureis percursa 5 lin. longa, calycis fructiferi lobis 2 majoribus basi nucem amplectante tumidis puberulis superne glaberrimis parum lucidis flavidis subæqualibus oblongis obtusissimis 9-nerviis denseque reticulatis 26-31 lin. longis 5-7 lin. latis 3 minoribus ovato-ellipticis acutis tomentellis dimidiam nucem æquantibus.

Ab omnibus mihi notis speciebus foliorum indumento costularumque numero distincta.

In pugillo priore, loco *Hopeæ micranthæ*, Hook. f.?, legatur *H. Pierrei*, Hance.

10. Pterospermum Pierrei, *sp. nov.*—Foliis basi oblique truncatis hinc gibbis haud peltatis oblongis obtuse acuminatis margine undulatis apicem versus paucidenticulatis supra lucidulis costa costulisque ad utrumque latus 6-7 impressis subtus tomento denso albido admixtis pilis fulvidis stellatis centro glandulosis tectis costa costulis venulisque transversis prominentibus cum petiolis ramulisque ob majorem stellarum copiam saturatius fulvis costulis 2 infimis ab ipsa folii basi egressis 3-5 poll. longis $1\frac{1}{4}$-$1\frac{3}{4}$ poll. latis petiolo 4-lineali, pedunculo $1\frac{3}{4}$. poll. longo cum calyce dense fulvo-stellato, capsula crasse stipitata tereti cylindracea apice rotundata obtusa fulvo-pannosa bipollicari.

In ins. Phu kok. Febr., 1874. Inter congeneres capsula cylindracea obtusissima imprimis dignoscendum.

11. Triumfetta (*Lappula*) grandidens, *sp. nov.*—Caulibus annuis erectis ramosis gracilibus pilis raris stellatis hinc inde consitis ceterum glabris asperiusculis, petiolis 1-3 lin. longis pilosis, foliis basi truncatis inferioribus profunde trilobis lobo medio oblongo lateralibus duplo longiore superioribus lanceolatis 7-12 lin. longis 2-5 lin. latis supra glaberrimis venoso-rugulosis opacis subtus pallidioribus venulis

saturatis piotis præter nervos strigosos glaberrimis grosse et inæqualiter patenti dentatis dentibus trientem v. quadrantem limbi latitudinis adæquantibus, floribus extra-axillaribus geminatis, fructibus pedicellis rigidis recurvis iis æquilongis fultis ovoideis indehiscentibus 2 lin. longis stellato tomentellis aculeis basi tantum tomentellis apice minute hyalino-uncinatis.

Proxima *T. neglectæ*, Wt. et Arn., abs qua foliorum forma dentibus et glabritate, fructumque indole certe specie diversa.

12. *Triumfetta* (*Lappula*) *procumbens*, Forst.—In ins. Phu kok. Petala basi glanduloso-incrassata, haud foveolata Ex sententia clar. Pierre, hæc est eadem ac *Porpa repens*, Bl., quod mihi haud satis liquet.

13. Elæocarpus (*Monocera*) argyrodes, *sp. nov.*—Ramulis angulatis glabris, foliis coriaceis glaberrimis oblongo v. elliptico-lanceolatis obtuse acuminatis margine incumbenti-serrulatis serraturis glandulosis supra lucidis subtus opacis dense reticulatis costulis utrinque 5-6 tenuibus axillis foveolatis $2\frac{1}{2}$-$3\frac{1}{2}$ poll. longis 1-$1\frac{1}{2}$ poll. latis petiolo $1\frac{1}{4}$ pollicari apice leviter incrassato, racemis axillaribus plerumque ternis simplicibus v. ramosis erectis folia circiter æquantibus, bracteis foliaceis ellipticis glanduloso-serrulatis 4-6 lin longis cum rachibus adpresse sericeis, alabastris ovatis acuminatis, floribus 8 lin. diametro pedicellis 6-10 linealibus, sepalis lanceolatis extus cano-sericeis intus glabris carinatis, petalis lanceolatis utrinque dense cano-pannosis apice glabro leviter inciso, staminibus circ. 50 antheris cum ovario biloculari adpresse villosis setis divaricato-reflexis.

Manifeste affinis *E. paniculato*, Wall., a me nondum viso, sed foliis duplo minoribus, serrulatis, forteque racemis foliaceo-bracteatis, quantum ex characteribus a Mastersio Miquelioque datis dividicare licet, recedere videtur.

14. Aspidopterys albo-marginata, *sp. nov.*—Ramis cortice fusco-cinereo glabro rugoso obductis, ramulis dense rufo-tomentosis, foliis tenuiter papyraceis ovali-oblongis basi rotundatis apice obtusis emarginatisve supra glabris opacis subtus pilis rufis dense tomentosis demum plus minus evanidis vestitis margine anguste pallido cinctis 3-4 poll. longis $1\frac{1}{2}$-2 poll. latis petiolo $\frac{3}{4}$ pollicari rufo-tomentoso, racemis ramulos terminantibus plerumque medio 2- apice 3- floris rufo-tomentosis supra medium bibracteatis, pedicellis capillaribus medio nodosis et bibracteolatis sesquipollicaribus, disco fructifero lineam diametro cupulato crasso nigro acute trilobo extus rugulosо, samaris orbiculatis tenuiter membranaceis pulcher ime radiatim reticulato-venosis 15 lin. diametro dorso crista 5 lin. alta $1\frac{1}{3}$ lin. diametro auctis.

Species ab omnibus hucusque descriptis, ut videtur, bene distincta, inter *A. concavam*, A. Juss, et *A. Helferianam*, Kurz, collocanda.

15. *Ochna Wallichii*, Planch.

16. Epicharis juglans, *sp. nov.*—Ramis ramulisque glabris, innovationibus ochraceo-tomentosis, petiolis tomentellis, foliolis utrinque 4-8 oppositis vel sub-oppositis breviter et crasse petiolatis subcoriaceis oblongis basi plerumque plus minus obliquis apice cuspidato-acuminatis utrinque glabris opacis costulis utrinque 10-15 cum costa supra impressis subtus plus minus prominentibus venularum rete plus minus conspicuo glandulis brunneis minutis consitis 3 7

poll. longis 2-3 poll. latis, racemis axillaribus linearibus puberulis simplicibus v. varius paniculatis 2-3 poll. longis multifloris, pedicellis calyci æquilongis cum calyce acute 4-lobo tomentosis, petalis 4 calyce duplo longioribus 2 lin. longis symptyxi valvatis crassiusculis oblongis acutis utrinque albido-sericeis, tubo stamineo tetragono tenuiter velutino apice truncato minute 8-denticulato, disco inferne glabro apice 8-denticulato longe setoso ovarium dense setosum adæquante, stylo basi setoso supra medium glabro, stigmate apice pervio, capsula matura glabra lucidula subsphærica 4-sulcata apice plerumque depressa profunde rugosa 4-valvi valvis apice basique cohærentibus diametro $1\frac{1}{4}$ pollicari, seminibus (in sicco) per totum ventrem convexum arillo tenui tectis dorso concavis.

In ins. Phu kok. Fructus *Juglandis* nuci aspectu quidpiam similis. Inter species omnes a divo Miquelio nuper sedulo retractatas (Ann. mus. bot. Lugd.-Bat. iv., 9) generique *Dysoxylo* ab eo relatas, nostra præcipue *E. speciosæ*, A. Juss. affinis videtur. Cl. Baillon generis limites multum prorogavit.

17. Aglaia pirifera, *sp. nov.*—Ramulis foliisque subtus minute griseo-lepidotis, foliolis 7-9 oppositis membranaceis oblongis basi cuneatis apice caudato-acuminatis supra glaberrimis opacis costulis ad utrumque latus 12-14 costaque subtus prominulis juxta marginem anastomosantibus venulis transversis inconspicuis $3\frac{1}{2}$-6 poll. longis $1\frac{3}{4}$-2 poll. latis petiolulis 2-3-linealibus, ramulis fructiferis folio brevioribus, baccis piriformibus vertice paululum depressis dense furfuraceo-lepidotis gilvo-cinereis 10 lin. longis 8 lin. latis.

Ad radices m. Kam chai, versus fines sianicos, Maio, 1874. Fructus, teste cl. inventore, edulis. Valde affinis *A. apiocarpæ*, Hiern!, sed foliis oblongis nec ellipticis, subtus minus distincte lepidotis, costulis numerosioribus, conspicuis, subtus elevatis differt. Nostræ flores illius fructus nondum inspexi. *A. lepidota*, Miq., ab ipso conditore serius cum *A. Roxburghiana*, Benth., compacta, fide speciminis a Teijsmannio communicati, est certe distincta; nec eam satis differe autumo a planta e Caledonia Nova, sub n. 3, sine nomine, a cl. Vieillard distributa, quam pro genuina *A. elæagnoidea*, Benth., a Miquelio et conjectura juxta *A. odoratissimam*, Bl., collocata, habeo. Stirpem sumatranam eandem esse ac australianam, olim, mihi quærenti et specimen ad comparandum mittenti, confirmaverunt botanici Kewenses. Nihilominus, speciem Miquelianam nuper *A. Roxburghianæ* subjecit cl. Hiern.

18. Aglaia pyramidata, *sp nov.*—Ramulis subteretibus lepidibus minutissimis rufis obsitis, foliolis alternis cum impari utrinque 7 breviter petiolulatis basi gibba inæquali lanceolato-oblongis breviter obtuse acuminatis membranaceis supra lucidulis costa paginaque hinc inde lepidibus sparsis albidis conspersis subtus sordide ochraceo-ferrugineis opacis lepidibus densis exilissimis oculo tantum armato obviis consitis costulis tenuissimis utrinque 12-15 vix elevatis $3\frac{1}{2}$-$4\frac{1}{2}$ poll. longis 11-14 lin. latis petiolo inferne nudo angulato rufo-lepidoto, paniculæ axillaris folio subduplo brevioris rachi ramisque alternis v. oppositis validis dense et minute rufo-lepidotis patentibus adscendentibus v. recurvis sensim abbreviatis, pedicellis $\frac{3}{4}$ lin. longis, calycis lobis late ovatis obtusis, baccis pisi-minoris mole subrotundis compressiusculis densissime rufo-lepidotis apice sæpe retusis bilocularibus di-v. abortu monospermis.

Ex charactere manifeste affinis *A. Ganggo*, Miq., quæ petiolis teretibus fructibusque multo majoribus recedere videtur.*

19. *Ximenia americana*, Linn.

20. *Rhamnus* (*Frangula*) *oreigenes*. Hance.—A speciminibus sinicis differt foliis margine revoluto, minus conspicue serrulatis, subtus pallidioribus, præter costam costulasque glabratis. Species florum fasciculis pedunculum validum umbellatim insidentibus imprimis insignis, a reliquis omnibus Asiaticis probe distincta. De genere *Rhamni* multum vacillant botanici; est tamen græcæ originis vox, a Plinio quidem *Rhamnos* scripta, et certe generis feminini.

21. *Turpinia montana*. Kurz.—Pace am. Kurz. hæc species mihi æque distare videtur a *T. ninalensi*, Wall.,—qualis saltem in China australiori reperitur,—ac a *T. pomifera*, DC.

22. *Xerospermum Noronhianum*, Bl —(teste am. Oliver.) In montibus Tamive, prov. Tpong, Cambodiæ, Maio, 1870. (Pierre, n. 876.)

23. Buchanania reticulata, *sp. nov.*—Innovationibus pilis ferrugineis cito deciduis conspersis, ramulis glaberrimis atropurpureis compresso-angulatis, foliis coriaceis obovatis v. oblongis nunc acumine brevissimo obtusis v. obtusissimis $2\frac{1}{2}$-6 poll. longis $1\frac{1}{4}$-2 poll. latis basi in petiolum $\frac{1}{3}$-1 pollicarem cuneato-angustatis vix lucidulis costa complanata venis primariis cum secundariis tertiariisque iis vix tenerioribus utrinque eximie reticulatis utrinque aspectu glaberrimis sed subtus adhibita lente dense et subtilissime glanduloso-lepidotis, paniculis terminalibus aggregatis folia duplo superantibus glaberrimis angustis ramulis adscendentibus distantibus cum ipsa rachi complanatis laxifloris, calycis laciniis oblongo-rotundatis glaberrimis petalis oblongis obtusissimis 6-plo brevioribus, staminum filamentis complanatis in apicem filiformem subito angustatis antheris sagittatis, disco hypogyno profunde multisulcato apice 10-12 lobulato pistilla 5-6 glabra v. vix puberula ad medium usque obtegente, drupa suboblique sphærica pisi minoris mole.

Ex descriptione satis fusa (doleo me iconem Gravanam haud vidisse), proxime videtur affinis *B. floridæ*, Schauer.† cui tamen paniculam corymbosam ea *B. latifoliæ*, Roxb., multo floridiorem adscripsit auctor. Præterea, nostra planta foliis valde et fere æqualiter utrinque reticulatis, subtus dense lepidotis, disco hypogyno sulcato, calycis lobis brevioribus petalisque obtusis diversa videtur. *B. intermedia*, Wt., ex icone, nostræ foliorum forma similis, horum constantia membranacea, inflorescentiaque adhuc densiori tute dignoscenda.

24. *Rourea similis*, Bl. (= *R. sororia*, Planch.)

25. *Flemingia* (*Ostryodium*) *strobilifera*, R.Br.

26. *Peltophorum dasyrachis*, Benth., ex cit. pag. op. Miqueliani. (= *Cæsalpinia dasyrachis*, Miq.)—Characteri Miqueliano conforme,

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* Ex habitu forte rectius gen. *Amooræ* adscribenda, cui *A. Ganggo*, Miq., nuperius retulit am. Kurz. (Journ. As. Soc. Bengal, xlv, 123.) Flores tamen non vidi.

† Teste cl. Marchand (Révis. du groupe des Anacardiacées, 117. 192), *B. florida* eadem est ac *B. intermedia*, Wt., quam subdubitans *B. latifoliæ* refert.

præter bracteas caducas, quæ in nostra planta plus minus persistunt. Ovarium fulvo-hirsutissimum. Stigma nec calyptratum, uti descripsit Miquelius, sed distincte peltatum, unde species clare generi Vogeliano adscribenda. Legumina non vidi.

27. *Dialium indum*, Linn.—*D. ovoideum*, Thw. ! huic magnopere affine, in herbario vix nisi foliis apice emarginatis discriminandum.

28. Parinarium (*Petrocarya*) anamense, *sp. nov.*—Ramis purpureis glaberrimis lenticellis albidis crebre notatis, ramulis petiolisque tomento denso cinereo-flavido tectis, foliis coriaceis ellipticis basi cuneatis apice obtusis supra lucidulis nervis omnino planis subtus tomento denso arachnoideo-albido tectis costa costulisque utrinque 10-15 prominulis sub angulo 40° egressis venulisque crassiusculis elevato-reticulatis 3 poll. longis $1\frac{1}{2}$ poll. latis petiolo crasso 5-lineali infra medium utrinque glandula parva calva nigra notato, panicula floribusque dense fulvido tomentosis, floribus in ramulis ultimis ternis sessilibus glomerulis bracteola ovata utrinque suffultis, calycis basi hinc gibbi laciniis acutis, petalis sessilibus rotundatis, staminibus 5-7, staminodiis paucis cum pilorum inflexorum coronula alterum floris latus occupantibus.

In montibus Cochinchinæ. *P. sumatrano*, Benth., et *P. costato*, Korth., affine ; petiolis glandulosis, costularum numero, aliisque notis discrepans.

29. *Bruguiera cylindrica*, Bl.—In ins. Phu kok. Planta neocaledonica a cl. Vieillard sub nomine *B. sexangulæ* distributa videtur identica. An reapse eadem ac *Rhizophora sexangula*, Lour. ?

30. *Carallia integerrima*, DC.—Specimina foliis quam in stirpe sinensi multo latioribus, obovatis, obtusissimis, cymisque magis ramosis prædita, ad formam a b. Arnottio *C. ceylanicam* nuncupatam pertinent.

31. Terminalia (*Catappa*) Papilio, *sp. nov.*—Ramis teretibus glabris innovationibus cano-tomentellis, foliis ovali-oblongis acutis v. obtusis supra glaberrimis lucidis penninerviis subtus minute lepidotis pallidis venarum rete glaberrimo pictis 1-$3\frac{1}{2}$ poll. longis $\frac{3}{4}$-$1\frac{1}{2}$ poll. latis petiolo semitereti glaberrimo semipollicari, spicarum folia superantium rachi ferrugineo-tomentella, drupis exsuccis sericeis trigono-ellipticis altera scilicet facie plana altera prominenti carinata 6 lin. longis 2 lin. latis alis binis distinctis divaricatis membranaceis glaberrimis transverse oblongis obtusissimis margine undulatis v. erosis nervis plurimis parallelis percursis fulvo-stramineis nitentibus sub pollicaribus altera nunc plus minus abbreviata auctis.

In ins. Phu kok, siamensis sinus. Species pulcherrima, *T. platypteræ*, F. Muell., ex. Australia septentrionali, ut videtur, potissime cognata.

32. *Terminalia* (*Myrobalanus*) *laurinoides*, Teijsm. et Binn. ?—In planitie prov. Sam rong tong, Apr. 1870. (Pierre, n. 524.) Nomen schedulæ inscripsit ipse cl. Pierre ; specimen in characterem a Miquelio datum quadrare videtur.

33. *Rhodamnia subtriflora*, Bl.—In ins. Phu kok. "Fructus maturus pungens, edulis." Hanc cum aliis speciebus *R. cinereæ*, Jack, subjunxit cl. Kurz. (Journ. As. Soc. Bengal. xl., 57.)

34. Decaspermum sericeum, *sp. nov.*—Ramis fusco-cinnamomeis breviter tomentosis novellis dense albo-villosis, foliis oppositis ovato-

lanceolatis caudato-acuminatis mucronatis supra in sicco fusco-nigricantibus lucidulis subtus fulventibus utrinque albo-tomentosis venis omnino inconspicuis 14-22 lin. longis 6-9 lin. latis petiolo lineali, ramulis axillaribus 4-6 floris albo-villosis folio dimidio æquilongis bracteis parvis lanceolatis ad basin pedicellorum fultis floribus 2 lin. longis bracteolis binis deciduis stipatis, calycis tubo albo-villoso limbi 5-lobi laciniis oblongis obtusiusculis æqualibus, petalis cochleatis ovalibus ciliatis, ovario 5-6-loculari loculis 1-ovulatis, stylo staminibus longiore.

35. *Pternandra cærulescens*, Jack.—Folia in sicco subtus fusco-hepatica.

36. Memecylon Pierrei. *sp. nov.*—Ramulis cinereo-albidis obscure tetragonis nodulosis, foliis coriaceis enerviis exacte ovatis basi rotundatis apice in acumen obtusum sensim attenuatis supra nitidis subtus flavidis opacis margine angusto nigricante cinctis costa prominula $3\frac{1}{2}$ poll. longis petiolo 4-lineali, cymulis petiolum duplo superantibus crassiusculis in ramulos 3-4 apice umbellas circ. 10-15 floras gerentes divisis, fructibus urceolato campanulatis levibus lineum longis calycis limbo latissime 4-lobo lobis brevissime apiculatis coronatis pedicellis iis æquilongo v. paulo breviore impositis.

M. grandi, Retz !, *M. eduli*, Roxb. !, *M. garcinioidi*, Bl., et præsertim *M. silvatico*, Thw. !, cui inflorescentia accedit, affines; sed a duobus prioribus florum dispositione, ab omnibus foliis exacte ovatis basi rotundatis fructibusque minoribus recedit.

37. Heptapleurum schizophyllum, *sp. nov.*—Foliis petiolum 20-pollicarem glaberrimum basi tumidum insidentibus digitatis, foliolis 7-9 membranaceis e basi obtusiuscula oblongis acuminatis tenuiter costulatis utrinque dense reticulatis supra glaberrimis subtus tomento stellato sparso obtectis laciniatis laciniis utrinque 2-3 profundis acutis foliolis lateralibus parum brevioribus subintegris 9-14 poll. longis 2-6 poll. latis petiolulis $2\frac{1}{2}$-5 pollicaribus, racemis umbelliferis validis 7-8 poll. longis furfuraceo-tomentosis, umbellis confertis circ. 10-floris pedunculo trilineali gestis, drupis ovoideo-pentagonis $2\frac{1}{2}$ lin. longis lineali-pedicellatis stigmatibus 5 parvis papillosis coronatis.

In monte Kam chai, Apr., 1874. A speciebus omnibus hactenus descriptis foliis incisis differe videtur.

38 Ophiorrhiza fucosa, *sp. nov.*—Radicibus lignoso-fibrosis, caule pedali infernè lignoso cum ramulis glabro, stipulis ad basin bifidis filiformibus, foliis æqualibus in petiolum semipollicarum longe attenuatis lanceolatis acuminatissimis $1\frac{1}{2}$-4 poll. longis $4\frac{1}{2}$-8 lin. latis papyraceis glabris venis primariis utrinque circ. 10 tenuibus arcuatis haud elevatis supra in sicco olivaceo-nigricantibus subtus cum cortice ramulis inflorescentia floribusque rubro-suffusis, cymis axillaribus et terminalibus pedunculo tomentello folium dimidium circ. æquante fultis trichotomis densiusculis corymbosis $\frac{3}{4}$ poll. tantum diametro ramulis unilatero-floridis, calycis $\frac{3}{4}$ lin. longi tubo campanulato pentagono angulis tumidis lobis triangulato-lanceolatis brevibus, corollæ tubulosæ sanguineæ 2-linealis lobis erectis obtusis fauce intus barbata, staminum filamentis brevissimis antheris faucem adtingentibus, stylo corolla duplo breviore stigmate bilamellato, capsula transverse oblonga compressa 2 lin. lata costulis crassis e calycis dentibus decurrentibus aliisque tenuioribus interjectis percursa ala rotundata marginatis.

Videtur affinis *O filistipulæ*, Miq., et *O. marginatæ*, Bl. Tota planta macerata aquam colore rubro inficit.

39. *Leucopogon malayanus*, Jack.—Cum specimine Singapuriano, a divo Rob. Schomburgk olim communicato, suppetentia exacte quadrant.

Quam, sub nomine provisorio *Bassiæ*?? *Krantzii*, in priore pugillo descripsi stirpem, libro de Generibus nondum accepto, teste am. Oliver in litt. est genuina *Dichopseos* species. A charactere tamen Benthamiano, ex autopsia mea, recedit, præter dicœcismum, calyce tripartito (serie interiore segmentorum deficiente), staminibusque biseriatis.

40. *Schrebera swietenioides*, Roxb.—In campis Cambodiæ, Apr., 1870. (Pierre, n. 530.)

41. Linociera (*Ceranthus*) cambodiana, *sp. nov.*—Ramis albido-cinereis glaberrimis, ramulis novellis cinereo-tomentosis, foliis e basi cuneata elliptico-lanceolatis obtusis rigide coriaceis glaberrimis tenuissime penniveniis venis venulisque utrinque leviter impressis vix conspicuis costa rubente subtus prominula 2½-3 poll. longis pollicem latis petiolo trilineali, paniculis in ramis hornis axillaribus folia superantibus v. æquantibus laxis rachibus cum calycibus cinereo-tomentosis trichotomis, floribus juxta apices ramulorum filiformium sæpius umbellato-fasciculatis pedicellos lin longos insidentibus, calycis ⅓ linealis ad medium 4-lobi lobis ovatis acutiusculis, petalis oblongis obtusis glabris basi per paria cohærentibus lineam longis, filamentis anthera duplo brevioribus.

In ins. Phu kok. *L. ramifloræ*, Wall.! et cognatis affinis, sed foliorum venatione, paniculis gracilibus tomentosis floribusque minoribus optime distincta.

42. *Parameria glandulifera*, Benth.—Ob corollam dextrorsum (sensu Candolleano) contortum, nectariumque e glandulis 5 compositum, huic, nec *Ecdysantheræ Griffithianæ*, Wt., referenda.

43. Mitrasacme (*Mitragyne*) setosa, *sp. nov.*—Perennis?, 3-4 pollicaris, erecta, a basi ramosa, setis albis patulis rigidis undique obsita, foliis linearibus 2-3 lin. longis, floribus axillaribus solitariis, pedicellis foliis æquilongis, calycis ad medium 4-fidi lobis lanceolatis æqualibus, corollæ trilinealis tubo calycis lobos paullo superanti intus piloso lobis oblongis obtusis tubo duplo brevioribus, filamentis longis liberis, antheris inclusis, stylis basi solutis stigmate capitellato, capsula parva subglobosa.

Species a paucis Asianis hucusque notis omnino diversa, forte *M. polymorphæ*, R. Br., proxime affinis.

44. *Fagræa auriculata*, Jack.—Præ manu est specimen unicum fructiferum, huic ut videtur referendum.

45. *F. fragrans*, Roxb.

46. Villarsia cambodiana, *sp. nov.*—Tota planta exsiccata olivaceo-fusca, spongiosa, foliis radicalibus ovato-oblongis integerrimis obtusis 2-2½ poll. longis 7-10 lin. latis introveniis petiolo 4-5 pollicari basi vaginante, caulibus floriferis folia paulo superantibus superne dichotomis folio unico petiolato ovato-lanceolato ad dichotomiæ basini bracteisque sessilibus lanceolatis ad ramificationes præditis, floribus 4-6 lateraliter aggregatis longe pedicellatis; calycis glaberrimi trilinealis basi obtusi laciniis oblongis obtusiusculis, corollæ calycem paulo excedentis segmentis (quantum observare potui) efimbriatis

ecristatisque, glandulis hypogynis parvis, ovario calyce breviore ovoideo basi lata adfixo, stigmatis sessilis lobis brevibus oblongis.

V. ovatæ, Vent., austro-africanæ, potius quam speciebus australicis imprimis videtur affinis; sed cum *Centrolepide cambodiana*, mihi, et *Mitrasacme setosa* supra descripta, vix dubie cognationem quamdam florarum Cambodiæ atque Australiæ indicat.

47. *Avicennia officinalis*, Linn.—Ad litora ins. Phu kok, Apr., 1874.

48. *Myristica Irya*, Gærtn.

49. *Cinnamomum Sintok*, Bl. ?—Sub manu sunt tantum ramus foliiferus absque floribus corticisque frustum satis magnum; quibus attente examinatis, simulque comparatis descriptione fusa Neesiana-Haynei Blumeique iconibus, necnon hujusce gravissimis observationibus, nostram stirpem hic pertinere puto, etsi a descriptione paululum recedit. Folia iis *C. obtusifolii*, N. ab E. (Jenkins ! ex Assamia), non dissimilia, ac æque margine cartilagineo-incrassata, sed magis coriacea, ovato-lanceolata v. ovato-oblonga, nec vere oblonga, nervis lateralibus juxta medium deliquescentibus, nec apicem adtingentibus, supra minus conspicuis reticulatione subtus magis conferta ac paulo minus elevata. Quod ad discrepantias attinet, nervi laterales rarissime ramulum lateralem emittunt, nec folia in acumen distincte producta invenio. Ea etiam, etsi valde coriacea, luci obversa, venarum dispositionem ostendunt. Cortex 5-6 lin. crassus, epidermide crassa pallide cinerea nodulosa transverse rimosa obtegitur, intus coloris rufo cinnamomei, sapore potius nuces moschatas quam cinnamomum æmulatur. Arbor 30-metralis, in m. Kam chai crescens. Cl. Pierre schedulæ inscripsit "cinnamomum cortice piperaceo-medicinali."

✓ 50. CINNAMOMUM SERICANS, *sp. nov.*—Ramis tenuiter pubentibus, foliis modice coriaceis e basi cuneata oblongis acutiusculis trinerviis nervis satis tenuibus supra vix subtus magis prominulis apicem adtingentibus venis transversis inconspicuis supra glaberrimis nitidis obsolete reticulatis subtus cum ramulis panicula floribusque dense adpresse canescenti-sericeis 4-6 poll. longis $1\frac{1}{2}$-2 poll. latis petiolo semipollicari, panicularum axillarum et terminalium folio paulo breviorum ramis simplicibus v. dichotomo-cymosis ramulis trifloris floribus $1\frac{1}{3}$ pedicellis 2 lin. longis.

In ins. Phu kok. Præcedenti, *C. obtusifolio*, N. ab E., et *C. zeylanico*, Bl., cognatum, sed a cunctis foliis subtus adpresse sericeis distinctum.

51. TETRANTHERA (*Cylicodaphne*) MACROCALYX, *sp. nov.*—Ramulis gemmisque tomentellis; foliis rigide coriaceis glaberrimis oblongis obtusis utrinque opacis nervis primariis utrinque 5-6 filiformibus subtus elevatis venarum rete inconspicuo 4-5 poll. longis $1\frac{1}{2}$-2 poll. latis petiolo pollicari, umbellis fructiferis simplicibus, cupula hemisphærica glaberrima margine undulato-truncata 6 lin. alta et lata stipite crasso 2-3 lin. longo suffulta baccis oblongis obtusis 9 lin. longis.

Affinis videtur *T. Wightiana*, Wall., venulis minus conspicuis, cupula majore brevius pedicellata, diversa.

In pugillo priore, loco *Heliciæ serratæ*, Bl. ?, legatur *H. excelsa*, Bl., monentibus botanicis Kewensibus.

52. *Linostoma decandrum*, Wall. — In ins. Phu kok, Apr., 1874.

53. *Aquilaria Agallocha*, Roxb.—In ins. Phu kok, Febr, 1874. (Pierre, n. 443.) Flores quam in *A. grandiflora*, Benth.! minores, brevius pedicellati ; folia paulo angustiora, sensim acuminata, nec cum acumine obtuso. Plantæ ceterum simillimæ.

54. Beidelia insulana, *sp. nov.*—Ramulis glaberrimis nigricantibus, foliis ovalibus acuminatis membranaceis glaberrimis supra lucidis reticulatis subtus pallidis opacis costulis utrinque 6-9 tenuibus prominulis venulis transversis vix conspicuis 2-3 poll. longis 12-14 lin. latis petiolo trilineali, floribus glomeratis sessilibus, fructibus ellipsoideis acutis 4 lin. longis calycem minimum haud accrescentem insidentibus.

In ins. Phu kok, Febr., 1874. Ab affini *B. tomentosa*, Bl., ramulis glaberrimis, foliis acuminatis, fructibus ellipsoideis distincta.

55. Cleistanthus tomentosus, *sp. nov.*—Ramulis teretibus novellis ferrugineo-tomentellis, stipulis setaceis hirtis petiolo æquilongis, foliis oblongo-lanceolatis cuspidato-acuminatis supra glaberrimis subopacis subtus pallidioribus piloso-tomentosis nervis venarumque rete conspicue elevatis 3-5½ poll. longis 12-16 lin latis petiolo 2½ lin. tomentello nigricante, floribus dense glomeratis sessilibus glabrescentibus bracteolis setaceis pilosis stipatis, capsula sessili trigastra sparsim setosa minute rugulosa 4 lin. diametro 3 lin. alta calycis laciniis lanceolatis reflexis stipata.

In insula Phu kok, sinus siamici. Affinis *C. pallido*, Müll.-Arg.!

56. *Chætocarpus castanicarpus*, Thw.!

57. *Trigonostemon ? Gaudichaudi*, Müll.-Arg.

58. *Podocarpus Blumei*, Endl.—In speciminibus quæ præ oculis jacent, folia 8-10 cent. long. 2-2½ cent. tantum lata, angustiora igitur quam a Blumeo (Rumphia iii., 217, t. 173), repræsentantur in stirpe javanica ; minus tamen de specifica identitate dubito. Hæc, divo Endlichero, subdubitante Parlatore, negante Miquelo, species sui juris a *P. latifolia*, Wall., diversa.*

59. Eria (*Eriura*) Carolettæ, *sp. nov.*—Radicibus crebre fibrosis glabris, caule basi vaginato, foliis distichis coriaceis rigidis linearilanceolatis acuminatis 4-5 lin. sub apice uno latere dente obtuso auctis acumine supra dentem dimidium folium tantum continuante nervosis subtus (in sicco) pustulatis 6-7 poll. longis 7 lin. latis, racemis lateralibus geminatis pedunculatis cylindraceis dense stellato-tomentosis laxe multi- (plusquam 50-) floris 5-6 poll. longis, bracteis lanceolatis scariosis glabratis lineam longis inferioribus vacuis erectis reliquis florem fulcientibus reflexis, floribus deflexis 2 lin. diametro, sepalis subæqualibus extus sparsim stellato-tomentellis postico oblongo acutiusculo lateralibus semi-ovatis obtusiusculis petalis oblongis obtusis, labelli basi apiceque tuberculo stamineo granuloso aucti medio

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* Notandum est cl. Bertrand differentias inter *P. Blumei*, Endl. et *P. latifoliam*, Wall., in interna structura foliorum invenisse. ("Anat. comp. d. tiges et d. feuilles chez l. Confères et les Gnétacées," in Anal. sc. nat., 6e. sér., xx., 67.)

furfuracei trilobi lobis lateralibus oblongis basi decurrentibus apice rotundatis terminali lineari, ovario lineari 7 lin. longo cum pedicello 3-lineali stellato-tomentoso.

Speciem in singulari generis sectione, ut videtur, optime distinctam, carissimæ conjugi, in laboribus botanicis semper strenuæ et auxiliabundæ adjutrici, gratus dico.

60. *Flueggia japonica*, Rich., var. *Wallichiana*.—In monte Kam chai alt 600 metr., Maio, 1874. Convenit plantis e Khasia et Japonia, a cl. Hook. fil. et Maximowicz lectis. Eandem varietatem in silvis cœnobium circumdantibus ad Ting ü shan, prov. Cantonensis, m. Jul., 1872, ipse legi.

61. FIMBRISTYLIS PYCNOSTACHYA, *sp. nov.*—Culmo $1\frac{1}{2}$-2 pedali rigido glabro plurisulcato subtereti sub apice compresso basi et parte inferiore foliato, foliis bifariis glaberrimis rigidis subfalcato-linearibus supra fusco-olivaceis lucidis subtus glaucescenti-pallidis opacis apice rotundato apiculato basi in vaginam lucidem ferrugineo-castaneam iis duplo latiorem pollicem longam ampliatis ibique sese arcte equitantibus 4-7 poll. longis 2 lin. latis, involucri foliolis 2-4 e basi ampliata ferruginea linearibus inflorescentiæ æquilongis, spiculis 30-60 compressis oblongis acutiusculis 3-5 lin. longis in fasiculos 5-8 aggregatis subsessilibus fasciculis in capitulum globosum pollicem diametro congestis v. rarius radiis 1-2 paulo exsertis umbellam compositam efformantibus, squamis subspiraliter quadrifariis lucide ferrugineo-castaneis margine concoloribus glaberrimis ovato-oblongis navicularibus nervo crassiusculo in aristulam excurrente $1\frac{1}{2}$ lin. longis staminum trium filamentis complanatis glabris stylum æquantibus antheris $\frac{3}{4}$ lin. longis basi sagittatis, rachilla subalata, achænio obconico trigono pallido apice truncato longitudinaliter scalpturato, stylo inferne glabro ad medium usque trifido.

In summo monte Kam chai, prov. Kam pot, substrato psammitico. Species insignis, *F. chætorrhizæ*, Kth. !, *F. Wightianæ*, N. ab E. !, cet. affinis, sed ab omnibus proximis foliorum basi valde dilatata, capitulis densis, spiculisque majoribus, bene distincta videtur. Beatus Kunth, de *F. decora*, Nees et Mey., planta ejusdem gregis, in sabulosis maritimis Chinæ australioris rarius occurente, scripsit "folia subtus (nec supra, ut Neesius dicit) sericea" In speciminibus vero quæ sub oculis jacent, folia nunc supra glaberrima nunc utrinque dense tomentosa juvenio. In hoc genere indumentum haud magni videtur valoris, quod rite animadvertens, *F. pentapetarum*, N. ab E., *F. salbundiæ*, Kth. jam retulit am. Thwaites.

62. *Orthopogon Burmanni*, R. Br.

63. *Thouarea sarmentosa*, Pers.—In ambulosis ins. Phu kok.

64. *Ischæmum muticum*, Linn.

65. *Polybotrya marginata*, Bl.

66. *Lomariopsis* (*Stenochlæna*) *scandens*, Mett.

67. *Pteris Dalhousiæ*, Hook —In monte Kam chai, alt. 900 metr., Maio, 1867. Filix speciosa, hucusque tantum in insulis Java et Penang reperta.

68. *Polypodium incurvatum*, Bl.

69. *P. Feei*, Mett.—In summis montibus ins. Phu kok, alt. 3000 metr.

70. *Davallia pedata*, Sw.

ON *PIERREA*, A NEW GENUS OF *SAMYDACEÆ*.

By H. F. Hance, Ph.D., Member Imp. Acad. Nat. Cur., etc.

Calycis tubus brevis, hemisphæricus; lobi 7-9, spathulato-oblongi, acutiusculi, rigide membranacei, scariosi, *Dipterocarporum* instar trinerves et reticulati, nervo medio supra prominulo, persistentes, symptyxi imbricati. Petala 7-9, oblongo-lanceolata, calycis fauci inserta, ejusque laciniis textu ac nervatione similia, sed minora, symptyxi imbricata, cum glandulis totidem pulvinatis dense tomentosis discum perigynum sulcatum marginantibus alternata. Stamina perplurima, 12-20 singulo petalo opposita, ejusque costæ basi ac paulo altius inserta, filamentis liberis, subulatis, pilosis, floris centrum versus inflexis; antheræ parvæ, didymæ, dorsifixæ, versatiles, extrorsum (?) dehiscentes. Ovarium liberum, hirsutum, conicum, verticaliter 4-lobum, 1-loculare; styli 4-5, breves, stigmatibus simplicibus; ovula plura, obovoidea, juxta apicem loculi inserta, pendula. Fructus? Arbuscula? Folia alterna, petiolata, oblongo-lanceolata, obsolete glanduloso-crenata. Stipulæ? Flores majusculi, in racemos axillares dispositi.

P. dictyoneura, *sp unica*.—Ramis subterctibus cortice glaberrimo ruguloso, foliis coriaceis lucidulis supra glaberrimis subtus glandulis minutis albidis ope lentis tantum perspiciendis densissime consitis costa venis primariis venularumque rete utrinque valde conspicuis et prominulis basi obtusis apice obtusiuscule acuminatis margine fere integro ad crenas obsoletas glanduloso 5-8 poll. longis $2\frac{1}{2}$ poll. latis petiolo 6-8 lineali, racemis densifloris $1\frac{1}{2}$-4 poll. longis rachi basi perulata valida cinereo-tomentosa, floribus brevissime pedicellatis bracteis 3 flabellato-rotundatis unguiculatis membranaceis coloratis extus tomentellis 3 lin. longis et latis stipatis, calycis tubo hirsuto laciniis tomentosis 6 7 lin. longis 2 lin. latis, petalis $3\frac{1}{2}$-4 lin. longis $1\frac{1}{4}$ lin. latis tomentosis.

In ins. Phu kok, sinus siamici, juxta oras Cambodiæ, legit amic. Lud. Pierre, horti Saigonensis director, cui lætus eximium sane ac distinctissimum genus sacro.

The systematic position of this fine genus is evidently amongst those few members of the tribe *Homalieæ* provided with a free ovary, which have been tribually distinguished by Payer and Baillon under the name of *Calanticeæ*, and all of which heretofore known were African. Amongst these, omitting other differences, it may be at once distinguished from *Calantica*, by its stamens being far more numerous than the sepals and petals; from *Bivinia*,* combined with the preceding by Baillon,† by the presence of petals; from *Dissomeria*, by the petals being equal in number to the sepals; and from all three, by the distinct insertion of the stamens at the base and at different points along the rigid midrib of the petals. The bracts and floral envelopes are of a pale reddish-brown colour, the latter very firm in texture.

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* By some oversight in the Conspectus of *Homalieæ*, in Bentham and Hooker's "Genera Plantarum" (i., 796). "Petala tot quot sepala" are ascribed to this genus. For these words "Petala nulla" should be substituted.

† Hist. des Plantes iv., 277.

The specimens at my disposal had most of the flowers a good deal eaten by insects, and their examination was in consequence rather troublesome. The Rev. J. C. Nevin was so kind as to dissect patiently a considerable number under the microscope, and to make excellent analytical drawings for me of the various organs.

ON THE CLASSIFICATION OF THE VEGETABLE KINGDOM.

By W. R. McNab, M.D.

[*Read at the Meeting of the British Association, August* 21*st*, 1877.]

This proposed classification is a modification of that of Sachs and Prantl, and most closely follows that recently published by Luerssen. The Orders are numbered consecutively from the lowest to the highest. In each Order a selected series of Families is given, the attention of the student being thus directed most prominently to the larger groups instead of to the more specialised ones. The present outline may be looked upon as a sort of supplement to the classification published by Mr. Dyer in his portion of the article "Biology," in the new edition of the "Encyclopædia Britannica." In the flowering plants the group of the Apetalæ is abolished, as suggested by Luerssen, and the families distributed among the Polypetalous Orders.

Sub-kingdom I. Thallophyta.

Class 1. Schizophyta or Protophyta.
- Order 1. *Cyanophyceæ* or *Phycochromaceæ*.
  - Families. Chroococcaceæ, Nostocaceæ, Oscillatoriaceæ, Rivulariaceæ, Scytonemaceæ.
- Order 2. *Chlorophyllophyceæ*.
  - Families. Palmellaceæ, Euglenaceæ.
- Order 3. *Schizomycetes*.
  - Family. Bacteriaceæ.
- Order 4. *Saccharomycetes*.
  - Families. Saccharomyceæ.

Class 2. Zygosporeæ.
- Order 5. *Zoosporeæ*.
  - Families. Pandorineæ, Hydrodictyæ, Confervaceæ, Ulvaceæ.
- Order 6. *Myxomycetes*.
- Order 7. *Conjugatæ*.
  - Families. Zygnemaceæ, Mesocarpeæ, Desmidiaceæ, Diatomaceæ.
- Order 8. *Zygomycetes*.
  - Families. Mucorineæ, Piptocephalidæ, Chætocladineæ.

Class 3. Oosporeæ.
- Order 9. *Cœnobieæ*.
  - Family. Volvocineæ.
- Order 10. *Sphæroplea*.

Order 11. *Cœloblasteæ.*
Families. Vaucheriaceæ, Caulerpaceæ, Chlorochytridieæ, Chytridieæ, Saprolegniaceæ, Peronosporeæ.
Order 12. *Œdogoniaceæ.*
Order 13. *Fucaceæ.*
Order 14. *Phæosporeæ.*
Class 4. CARPOSPOREÆ.
Order 15. *Coleochæteæ.*
Order 16. *Florideæ.*
Order 17. *Characeæ.*
Order 18. *Ascomycetes.*
Families. Erysiphei, Discomycetes, Tuberacei, Pyrenomycetes, Lichenes.
Order 19. *Æcidiomycetes.*
Order 20. *Ustilagineæ.*
Order 21. *Basidiomycetes.*
Sub-order 1. Gasteromycetes.
Sub-order 2. Hymenomycetes.

SUB-KINGDOM II. BRYOPHYTA.

Class 5. HEPATICÆ.
Order 22. *Ricciaceæ.*
Order 23. *Anthoceroteæ.*
Order 24. *Marchantiaceæ.*
Order 25. *Jungermanniaceæ.*
Class 6. MUSCI.
Order 26. *Sphagna.*
Order 27. *Schizocarpæ.*
Order 28. *Cleistocarpæ.*
Order 29. *Stegocarpæ.*
Sub-order 1. Acrocarpæ. Sub-order 2. Pleurocarpæ.

SUB-KINGDOM III. PTERIDOPHYTA.

Class 7. FILICINÆ.
Order 30. *Filices.*
Families. Hymenophyllæceæ, Polypodiaceæ, Cyathæaceæ, Gleicheniaceæ, Schizæaceæ, Osmundaceæ.
((Fossil) Sphenopterideæ, Neuropterideæ, Pecopteridæ, Tæniopterideæ, Dictyopteridæ.)
Order 31. *Marattiaceæ.*
Order 32. *Ophioglossaceæ.*
Order 33. *Rhizocarpeæ.*
Families. Salviniaceæ, Marsileaceæ.
Class 8. EQUISETINÆ.
Order 34. *Equisetaceæ.*
Families. Equisetaceæ, (fossil, Calamarieæ).
Class 9. LYCOPODINÆ.
Order 35. *Lycopodiaceæ.*
Order 36. *Ligulatæ.*
Families. Isoetaceæ, Selaginelleæ.
((Fossil) Lepidodendræ, Sigillarieæ.)

Sub-kingdom IV. Phanerogamia.

Class 10. Archiespermæ or Gymnospermæ.
Order 37. *Cycadeæ.*
Order 38. *Coniferæ.*
Sub-order 1. Taxaceæ.
Sub-order 2. Araucariaccæ.
Order 39. *Gnetaceæ.*

Class 11. Monocotyledones.
Order 40. *Helobiæ.*
Families. Lemnaceæ, Naiadaceæ, Hydrocharideæ, Juncagineæ, Alismaceæ.
Order 41. *Spadicifloræ.*
Families. Typhaceæ, Aroideæ, Pistiaceæ, Pandaneæ, Cyclanthaceæ. Palmæ.
Order 42. *Glumaceæ.*
Families. Gramineæ, Cyperaceæ.
Order 43. *Enantioblastæ.*
Families. Centrolepidæ, Restiaceæ, Eriocauloneæ, Xyrideæ, Commelynaceæ.
Order 44. *Liliifloræ.*
Families. Juncaceæ, Liliaceæ, Amaryllidacæ, Hypoxidaceæ, Iridaceæ, Taccaceæ, Dioscoreæ, Bromeliaceæ.
Order 45. *Scitamineæ.*
Families. Marantaceæ, Zingiberaceæ, Musaceæ.
Order 46. *Gynandræ.*
Families. Orchidaceæ, Burmanniaceæ.

Class 12. Dicotyledones.
Sub-class 1. Choripetalæ.
1. Julifloræ.
Order 47. *Piperinæ.*
Families. Piperaceæ, Chloranthaceæ.
Order 48. *Urticinæ.*
Families. Urticaceæ, Moraceæ, Ulmaceæ, Plantanaceæ.
Order 49. *Amentaceæ.*
Families. Betulaceæ, Corylaceæ, Cupuliferæ.
2. Terebinthinæ.
Order 50. *Juglandinæ.*
Families. Myricaceæ, Juglandaceæ, Casuarineæ, Balsamifluæ.
Order 51. *Rutinæ.*
Families. Terebinthaceæ, Rutaceæ.
3. Tricoccæ.
Order 52. *Tricoccæ.*
Families. Euphorbiaceæ, Empetraceæ.
4. Aphanocyclicæ.
Order 53. *Hydrobryinæ.*
Families. Podostemaceæ, Callitrichaceæ, Hippurideæ, Ceratophyllaceæ.
Order 54. *Nymphæinæ.*
Families. Nymphæaceæ, Nelumbiaceæ, Cabombeæ.
Order 55. *Polycarpiceæ.*
Families. Myristicaceæ, Lauraceæ, Berberidaceæ, Menispermaceæ, Schizandraceæ, Magnoliaceæ, Anonaceæ, Dilleniaceæ, Ranunculaceæ.

Order 56. *Rhœadinæ.*
Families. Papaveraceæ, Sarraceniaceæ, Fumariaceæ, Cruciferæ, Capparidaceæ, Resedaceæ.
?Order 57. *Opuntinæ.*
Families. Mesembryanthemaceæ, Cactaceæ, Begoniaceæ.
5. Eucyclicæ.
Order 58. *Parietales.*
Families. Violaceæ, Cistaceæ, Droseraceæ, Frankeniaceæ, Loasaceæ, Passifloraceæ, Bixaceæ.
Order 59. *Guttiferæ.*
Families. Salicineæ, Tamariscineæ, Hypericaceæ, Ternstrœmiaceæ, Dipterocarpeæ, Aurantiaceæ, Meliaceæ.
Order 60. *Frangulinæ.*
Families. Vitaceæ, Rhamnaceæ, Celastrineæ, Aquifoliaceæ, Hippocrateaceæ.
Order 61. *Æsculinæ.*
Families. Sapindaceæ, Malpighiaceæ, Tropæolaceæ, Polygalaceæ.
Order 62. *Gruinales.*
Families. Balsaminæ, Oxalideæ, Zygophyllaceæ, Linaceæ, Geraniaceæ.
Order 63. *Columniferæ.*
Families. Byttneriaceæ, Tiliaceæ, Malvaceæ.
6. Centrospermæ.
Order 64. *Polygoninæ.*
Family. Polygonaceæ.
Order 65. *Caryophyllinæ.*
Families. Nyctagineæ, Chenopodiaceæ, Amarantaceæ, Caryophyllaceæ, Phytolaccaceæ, Portulacaceæ.
7. Calycifloræ.
Order 66. *Serpentariæ.*
Families. Aristolochiaceæ, Nepenthaceæ, Rafflesiaceæ.
Order 67. *Santalineæ.*
Families. Santalaceæ, Loranthaceæ, Balanophoraceæ.
Order 68. *Thymelinæ.*
Families. Thymelæaceæ, Elæagnaceæ, Proteaceæ.
Order 69. *Umbelliforæ.*
Families. Cornaceæ, Araliaceæ, Umbelliferæ.
Order 70. *Saxifraginæ.*
Families. Elatinaceæ, Crassulaceæ, Saxifragaceæ, Ribesiaceæ.
Order 71. *Myrtiforæ.*
Families. Gunneraceæ, Halorraghidæ, Rhizophoraceæ, Onagraceæ, Combretaceæ, Melastomaceæ, Lythraceæ, Myrtaceæ.
Order 72. *Rosiforæ.*
Families. Monimiaceæ, Pomaceæ, Rosaceæ, Poteriaceæ, Dryadaceæ, Spiræaceæ, Amygdalaceæ.
Order 73. *Leguminosæ.*
Families. Mimosaceæ, Cæsalpiniaceæ, Papilionaceæ.
Sub-class 2. GAMOPETALÆ.
Order 74. *Primulinæ.*
Families. Primulaceæ, Myrsineæ, Plumbagineæ.

Order 75. *Diospyrinæ.*
Families. Sapotaceæ, Ebenaceæ.
Order 76. *Bicornes.*
Families. Epacridaceæ, Ericaceæ, Vacciniaceæ, Rhodoraceæ, Hypopityaceæ.
Order 77. *Diandræ.*
Families. Oleaceæ, Jasminaceæ.
Order 78. *Contortæ.*
Families. Gentianaceæ, Apocynaceæ, Asclepiadaceæ.
Order 79. *Tubifloræ.*
Families. Convolvulaceæ, Polemoniaceæ, Hydrophyllaceæ, Boragineæ, Solanaceæ.
Order 80. *Labiatifloræ.*
Families. Labiatæ, Scrophulariaceæ, Lentibulariaceæ, Gesneriaceæ, Bignoniaceæ, Acanthaceæ, Verbenaceæ, Plantaginaceæ.
Order 81. *Campanulinæ.*
Families. Campanulaceæ, Lobeliaceæ, Stylidiaceæ, Goodeniaceæ, Cucurbitaceæ.
Order 82. *Aggregatæ.*
Families. Rubiaceæ, Caprifoliaceæ, Valerianaceæ, Dipsacaceæ, Compositæ.

LIST OF THE PLANTS OBTAINED DURING MR. C. GILES'S TRAVELS IN AUSTRALIA IN 1875 AND 1876.

By Baron Ferd. von Mueller, C.M.G., M.D., Ph.D., F.R.S.

(*Concluded from p.* 306.)

Bignoniaceæ.

Tecoma australis. R. Br., Prodr., 471 ; var. *minutifolia.* MacDonnell's Range (C. Giles).

Asperifoliæ.

Heliotropium asperrimum, R. Br., Prodr., 493. MacDonnell's Range (C. Giles) ; between Youldeh and the Elizabeth River.

H. pleiopterum, F. v. M. ix., 121. MacDonnell's Range (C. Giles).

H. undulatum, Vahl. Symb. i., 13. Lake Eyre (Lewis).

Cynoglossum Drummondi, Benth., Fl. Austr. iv., 409. MacDonnell's Range (C. Giles).

Halgania cyanea, Lindl. Bot. Reg. xxv., App. 40. MacDonnell's Range (C. Giles) ; between Victoria Springs and Ullaring; between Youldeh and the Elizabeth River; near the Alfred-Marie Ranges.

H. integerrima, Endl. in Ann. Wien. Mus. ii., 205. Near Mount Churchman

H. anagalloides, Endl. in Ann. Wien. Mus. ii., 204. MacDonnell's Range (C. Giles).

H. lavandulacea, Endl., l.c., 205. Great Bight.

Trichodesma zeylanicum, R. Br., Prodr., 496. MacDonnell's Range (C. Giles); Ashburton River; Alfred-Marie Ranges. Most nutritious to dromedaries, according to Mr. E. Giles.

Labiatæ.

Westringia rigida, R. Br. Between Youldeh and the Elizabeth River; Victoria Springs; Great Bight.

Hemigenia brachyphylla, F. v. M. Near Ullaring; thence towards Mount Jackson.

H. westringioides, Benth. Near Mount Churchman.

Prostanthera striatiflora, F. v. M., in Linnæa xxv., 425. MacDonnell's Range (C. Giles); between Ullaring and Mount Jackson.

P. Eckersleyana, F. v. M., Fragm. x., 17. Near Mount Churchman.

P. coccinea, F. v. M. in Transact. Phil. Soc. Vict. i., 48; var. *pedunculosa*. Near Mount Churchman.

P. Grylloana, F. v. M., Fragm. x., 17. Near Ullaring.

Wrixonia prostantheroides, F. v. M., Fragm. x., 18. Near Mount Churchman.

Mentha grandiflora, Benth. in Mitch. Trop. Austral., 362. Between Youldeh and the Elizabeth River.

Teucrium racemosum, R. Br., Prodr. 504. Between Youldeh and the Elizabeth River; Great Bight; Victoria Springs.

Verbenaceæ.

Lachnostachys Cliftoni, F. v. M., Fragm. ix., 3. Between Victoria Springs and Ullaring.

Newcastlia cephalantha, F. v. M., Fragm. ix., 4. Between the Alfred-Marie and Rawlinson Ranges.

N. hexarrhena; F. v. M., Fragm. x., 16. Between Victoria Springs and Ullaring.

N. bracteosa, F. v. M., Fragm. viii., 49. Victoria Springs.

N. chrysotricha, F. v. M., Fragm. x., 15. Victoria Springs.

Mallophora globiflora, Endl. Nov. Stirp. Decad., 64. Near Mount Churchman.

Dicrastyles Nicholasii, F. v. M., Fragm. x., 15. Victoria Springs.

D. Gilesii, F. v. M., Fragm. viii., 229. Victoria Springs.

D. parvifolia, F. v. M., Fragm. ii., 160. Near Ullaring.

Chloanthes loricata, F. v. M., Fragm. x., 14. Victoria Springs; near Ullaring.

C. Elderi, F. v. M., Fragm. x., 13. Between Victoria Springs and Ullaring.

C. stachyoides, F. v. M., Fragm. v., 50. Near Mount Churchman.

C. halganiacea, F. v. M., Fragm. x., 14. Near Mount Churchman.

Cyanostegia Turczaninowii, F. v. M., Fragm. vi., 154. Near Mount Churchman; var. *dentatifolia*, between Victoria Springs and Ullaring; thence towards Mount Jackson.

Clerodendron lanceolatum, F. v. M., Fragm. iii, 145. Between the Rivers Ashburton and Gascoyne, up to their sources.

Verbena officinalis, L., Sp. Pl., 20. Lake Eyre (Lewis).

Myoporinæ.

Myoporum humile, R. Br., Prodr., 516. Great Bight.

M. deserti, A. Cunn. in Hueg. Enum., 78. Between Youldeh and the Elizabeth River.

M. Cunninghami, Benth. in Hueg. Enum., 78. Between Youldeh and the Elizabeth River.

M. platycarpum, R. Br. Between Youldeh and Ouldabinna.

Eremophila maculata, F. v. M. in Pap. Roy. Soc. Tasm. iii., 297. Between Youldeh and the Elizabeth River; near Ullaring; Great Bight; between Yuim and the Murchison River.

E. Latrobei, F. v. M. in Pap. Roy. Soc. Tasm. iii., 294. MacDonnell's Range (C. Giles); north of Fowler's Bay; between the Elizabeth River and Youldeh; thence towards Ouldabinna; beyond the Alfred-Marie Ranges.

E. latifolia, F. v. M. in Linnæa xxv., 428. North of Fowler's Bay; between Youldeh and the Elizabeth River; between Yuim and the Murchison River; Gascoyne River.

E. Brownii, F. v. M. in Pap. Roy. Soc. Tasm. iii., 297. North of Fowler's Bay; between Youldeh and the Elizabeth River.

E. longifolia, F. v. M. in Pap. Roy. Soc. Tasm. iii., 295. North of Fowler's Bay.

E. oppositifolia, R. Br., Prodr., 518. Between Youldeh and the Elizabeth River.

E. Youngii, F. v. M., Fragm. x., 16. Between Victoria Springs and Ullaring.

E. Sturtii, R. Br., App. to Sturt's Centr. Austr., 85. Between Youldeh and Ouldabinna.

E. Paisleyi, F. v. M., Report on Babb. Pl., 17. Between Victoria Springs and Ullaring; var. *dimidata*, Victoria Springs.

E. Goodwini, F. v. M., Rep. on Babb. Pl., 17; var. *denticulata*. Near Ouldabinna thence towards Youldeh.

E. eriocalyx, F. v. M., Fragm. i., 236. Near Ullaring; Victoria Springs.

E. Macdonnelli, F. v. M., Rep. on Babb. Pl., 18. Lake Eyre (Lewis).

E. alternifolia, R. Br., Prodr., 518. Great Bight.

E. Weldii, F. v. M., Fragm. vii., 109. Great Bight.

E. Christophori, F. v. M., Fragm. vii., 120. Between MacDonnell's Range and Charlotte Waters (C. Giles).

E. Berryi, F. v. M., Fragm. viii., 228. Between Youldeh and Ouldabinna

F. Forrestii, F. v. M., Fragm. vii., 49. Between Ullaring and Mount Jackson.

E. Delisserii, F. v. M., Fragm. v., 108, t. 41. North of Fowler's Bay.

E. scoparia, F. v. M., in Pap. Roy. Soc. Tasm. iii., 296. Between Youldeh and the Elizabeth River; north of Fowler's Bay; Great Bight.

E. Turtoni, F. v. M., Fragm. x., 87. Between the Alfred-Marie and Rawlinson Ranges.

E exilifolia, F. v. M., Fragm. x., 88. Between the Alfred-Marie and Rawlinson Ranges.

Coniferæ.

Frenela verrucosa, Mirbel in Mem. du Mus. Paris xiii., 74. MacDonnell's Range (C. Giles); Victoria Springs.

Cycadeæ.

Macrozamia Macdonnelli, F. v. M., Fragm. ii., 179. MacDonnell's Range (C. Giles).

Orchideæ.

Microtis alba, R. Br., Prodr., 321. Between Victoria Springs and Ullaring; near Mount Churchman.

Hæmodoraceæ.

Conostylis bromelioides, Endl. in Lehm. Plant. Preiss. ii., 18. Near Mount Churchman.

Anigozanthos humilis, Lindl., Bot. Regist. xxv., App. 46, t. 6. Near Mount Churchman.

Amaryllideæ.

Crinum flaccidum, Herbert in Bot. Mag., 2133. Lake Eyre (Lewis).

Melanthaceæ.

Anguillaria australis, F. v. M., Fragm. vii., 74. Between Youldeh and the Elizabeth River; beyond the Alfred-Marie Ranges.

Liliaceæ.

Cæsia rigidifolia, F. v. M., Fragm. x., 48. Victoria Springs.

Bulbine semibarbata, Haw. Revis. 33. Between Youldeh and Ouldabinna.

Thysanotus Manglesianus, Kunth. Enum. iv., 616. Near Mount Churchman.

Dianella revoluta, R. Br., Prodr., 280. Great Bight; Victoria Springs; thence towards Ullaring.

Xanthorrhæa Preissii, Endl. in Lehm. Plant. Preiss. ii., 39. Victoria Springs.

Xanthorrhæa, sp. Sources of the Ashburton River.

Aphyllanthaceæ.

Borya nitida, Labill. Nov. Holl. Plant. Specim. i., 81, t. 107. Between Ullaring and Mount Jackson.

Xerotideæ.

Xerotes leucocephala, R. Br., Prodr., 260. North of Fowler's Bay; Victoria Springs; between Youldeh and the Elizabeth River.

Juncaceæ.

Juncus pallidus, R. Br., Prodr., 258. Near Ullaring.

Restiaceæ.

Lepidobolus Preissianus, Nees in Lehm. Plant. Preiss. ii., 66. Victoria Springs.

Cyperaceæ.

Caustis dioica, R. Br., Prodr., 239. Victoria Springs.

Lepidosperma angustatum, R. Br., Prodr., 235. Near Mount Churchman.

L. læve, R Br., Prodr., 235. Between Victoria Springs and Ullaring.

Fimbristylis communis, Kunth. Enum. ii., 234. Lake Eyre (Lewis); MacDonnell's Range (C. Giles).

Scirpus pungens, Vahl. Enum. ii., 255. Lake Eyre (Lewis).

S. barbatus, Rottb. Nov. Plant., 52. MacDonnell's Range (C. Giles).

Cyperus rotundus, L., Syst. Veg., 98. MacDonnell's Range (C. Giles).

C. Iria, L., Sp. Pl., 45. MacDonnell's Range and Charlotte Waters (C. Giles).

C. textilis, Thunb. Prodr. Pl. Cap., 18. MacDonnell's Range (C. Giles); Upper Ashburton River.

C. Holoschænus, R. Br., Prodr., 215. MacDonnell's Range (C. Giles).

C. pygmæus, Rottb. Plant. Nov., 20, t. 14. f. 45. Charlotte Waters (C. Giles).

Gramineæ.

Agrostis actinoclada, F. v. M., Fragm. viii., 140. Lake Eyre (Lewis); MacDonnell's Range (C. Giles); between Youldeh and the Elizabeth River.

A. Solandri, F. v. M., Veg. of the Chath. Isl. 60. Victoria Springs.

Aristida stipoides, R. Br., Prodr., 174. Lake Eyre (Lewis); towards Charlotte Waters; near Mount Churchman; between Youldeh and the Elizabeth River; Victoria Springs; Upper Ashburton River.

Stipa crinita, Gaudich. in Freyc. Voy. Bot., 447. Near Ouldabinna.

Amphipogon Brownii, F. v. M., Fragm. viii., 201. Victoria Springs.

Bromus arenarius, Labill. Nov. Holl. Plant. Specim. i., 23, t. 28. Near Ullaring.

Festuca fusca, L., Sp. Pl. Edit. Ser., 139. Lake Eyre (Lewis).

F. irritans, F. v. M., Chath. Isl. Veget., 59. Victoria Springs.

Poa (*Eragrostis*), sp. North of Fowler's Bay. (Several species of the section *Eragrostis* in Central Australia).

Danthonia pectinata, Lindl. in Mitch. Three Exped. ii., 26. Lake Eyre (Lewis).

Eriachne aristidea, F. v. M., Fragm. v., 205. Charlotte Waters (C. Giles); Lake Eyre (Lewis).

E. ovata, Nees in Hook. Lond. Journ. ii., 416. Charlotte Waters (C. Giles); Lake Eyre (Lewis); near Mount Churchman.

E. obtusa, R Br., Prodr., 184. Between Youldeh and Ouldabinna.

Pappophorum commune, F. v. M., in Greg. Rep Leichh. Search App., 10. Lake Eyre (Lewis); north of Fowler's Bay; Youldeh; thence towards the Elizabeth River; MacDonnell's Ranges; Upper Ashburton River.

Triraphis mollis, R. Br., Prodr., 185. Lake Eyre (Lewis); north of Fowler's Bay; between Youldeh and the Elizabeth River; between the Gascoyne and Ashburton Rivers.

Eleusine cruciata, Lam. Encyc., t. 48, f. 2. Lake Eyre (Lewis); MacDonnell's Range (C. Giles).

Chloris barbata, Sw., Flor. Ind. Occid. i., 200. Musgrave Ranges (Gosse).

C. divaricata, R. Br., Prodr., 186. Lake Eyre (Lewis).

Cynodon convergens, F. v. M., Fragm. viii., 113. Charlotte Waters (C. Giles).

Panicum decompositum, R. Br., Prodr., 191. Lake Eyre (Lewis); MacDonnell's Range (C. Giles); north of Fowler's Bay; between Youldeh and the Elizabeth River.

P. Pseudo-Neurachne, F. v. M., Fragm. viii., 199. Lake Eyre (Lewis); MacDonnell's Range (C. Giles).

P. gracile, R. Br., Prodr., 190. MacDonnell's Range (C. Giles).

P. Brownii, R. et S., Syst. Veg. ii., 462. North of Fowler's Bay.

Lappago racemosa, Schreb., Ed. Octa. Linn. Gen Plant. i., 55. Lake Eyre (Lewis); MacDonnell's Range (C. Giles); north of Fowler's Bay.

Setaria refracta, F. v. M., Fragm. iii., 147. MacDonnell's Range (C. Giles).

Neurachne alopecuroides, R. Br., Prodr., 196. Near Mount Churchman.

Spinifex hirsutus, Labill. Nov. Holl. Plant. Specim. ii., 81, t. 230-231. Great Bight.

Anthistiria membranacea, Lindl. in Mitch. Trop. Austr., 88. Lake Eyre (Lewis); between Youldeh and the Elizabeth River.

A. ciliata, L. fil., Dissert. de Nov. Gramin. Gen. 35. MacDonnell's Range (C. Giles).

Andropogon pertusus, Willd., Spet. Plant. iv., 922. Lake Eyre (Lewis).

A. laniger, Desf., Fl. Atlant. ii., 379. MacDonnell's Range (C. Giles); between the Alfred-Marie and Rawlinson Ranges; near Mount Churchman; near Ullaring.

A. Gryllus, L., Sp. Pl. Sec. Edit, 1483. Near MacDonnell's Range (C. Giles).

Erianthus fulvus, Kunth. Gramin. i., 160. Lake Eyre (Lewis); Youldeh; thence towards the Elizabeth River; between the Gascoyne and Ashburton Rivers.

Filices.

Cheilanthes tenuifolia, Sw., Syn. Fil., 129. MacDonnell's Range (C. Giles); Youldeh; thence towards the Elizabeth River; between Victoria Springs and Ullaring; Alfred-Marie Ranges; between the Rivers Gascoyne and Ashburton.

C. vellea, F. v. M., Fragm. v., 123. Lake Eyre (Lewis); MacDonnell's Range (C. Giles); north of Fowler's Bay; between Youldeh and the Elizabeth River.

Grammitis rutifolia, R. Br., Prodr., 146. MacDonnell's Range (C. Giles).

Marsiliaceæ.

Marsilia quadrifolia, L., Sp. Pl., 1099; var. *salvatrix*. Lake Eyre (Lewis).

Lichenes.

Parmelia corniculata, Krempelh. in Litt.

SHORT NOTES.

Naias flexilis in Kerry.—I have to record a second Irish locality for this very rare plant. On the 18th of Sep'ember last, while dragging in Lough Caragh for a fishing-rod which had been dropped overboard the previous evening, I brought up, together with a large mass of *Chara flexilis*, some bright green fragments, and on close examination I was much pleased to recognise them as *Naias flexilis*, Rostk., having myself several times collected it in the small lake called Lough Creg-duff, near Roundstone, which, since the first finding by Prof. Oliver, has remained for twenty-seven years the only known locality in Ireland. In Lough Creg-duff the *Naias* grows intermixed with *Chara aspera* and other subaqueous plants, close to the margin of the lake, in water only two or three feet deep; but in Lough Caragh, at the place where I dredged up the plant, the water was not less than fifteen to twenty feet in depth, at the south-east corner of the lake, close to the steep wood.d bank, and not far from the reed beds which surround the mouth of the river Caragh. In Lough Caragh grow *Eriocaulon septangulare*, *Isoetes lacustris*, *Lobelia Dortmanna*, etc., and in the immediate neighbourhood *Pinguicula grandiflora*, *Bartsia viscosa*, *Trichomanes radicans*, and *Euphorbia hyberna*. The rare Slug *Geomalacus maculosus* occurs nearly all round the lake, and the Natterjack Toad (*Bufo calamita*), so local in Ireland, abounds in many places along the shores of Dingle Bay. Our drag was made of thorn bushes (*Prunus spinosa*) bound together and kept in place by two cross-pieces of wood and weighted with some ten pounds of iron, an implement invented for the occasion by our ingenious fisherman, and which I venture strongly to recommend to botanists who wish to explore the vegetation at the bottom of any lake.—A. G. More. October 4th, 1877.

Phragmites macer, *Munro*.—The characters of this new species, mentioned by name only at p. 298, have been kindly forwarded by Gen. Munro:—Stolonifer. Culmus gracilis sub 2-pedalis nodis glabris. Vaginæ glabræ nisi interdum sub apice parce pilosæ. Ligula *brevissima* vix conspicua. Folia supra *pallidiora*, linearilanceolata utrinque attenuata, sub 7 uncias longa et 3-5 lineas lata tactu aspera cæteroquia glabra. Panicula *macer*, vix 4 uncias longa, ramulis 5 alternis ex ima basi compositis inferioribus *sterilibus* scabris sed non hirsutis. Spicula sub 5-flora (flosculis infimis 3 fertilibus), 5 lin. longa pedicellis brevibus. Glumæ inæquales inferior vix 1 lin. superior 2 lin. longa, ambæ trinerves, *margine membranaceo*, acutæ. Flosculus infimus *non sessilis* ut fieri solet in genere *Phragmites*. Palea inferior (arista inclusa) 3 lin. longa, 3-nervis margine membranaceo *hoc margine parce piloso*. Palea superior brevior, obtusa, dorso parce pilosa. Stamina 3. Styli 2 basi disjuncti. Squamulæ obtusissimæ, obovatæ, apice pilis paucis fimbriatæ. Ovarium glabrum.—In *P. mauritiano* flosculus infimus sæpe hermaphroditus. Paleæ in *Phragmites* plerumque glabræ sunt.—*Hab.* Japonia, Ngama. Bisset, no. 805.

New British Riccias.—*Riccia tumida*, Lindenberg, was collected by W. Joshua, Esq., in the bed of the River Teify, Landyssil, Cardi-

ganshire, May, 1877.—*R. ciliata*. Hoff., was gathered by myself at Barmouth, Merionethshire, in April, 1876, sparingly, and again in December, and in quantity in August, 1877.—*R. Bischoffii*. Hubner (?), I collected at Barmouth in April, 1876, and August, 1877. There is a little doubt whether this is a form of *R. Bischoffii* or a distinct species.—Dr. Carrington is now engaged upon a description of these three species, and intends to publish drawings and full diagnoses of each. It is rather remarkable that during the past two years three species, all belonging to the ciliate section, should be added to the British flora. Barmouth is now especially rich in Riccias; beside the two new ones above recorded, there have been also collected there by Mr. Ralfs and Dr. Carrington, *R. glauca*, Linn., *R. minima*, Linn., *R. nigrella*. DC, *R. fluitans*, Linn. (fruiting form).—By the kindness of Dr. Carrington, I have just seen specimens of a *Riccia* belonging to the ciliate section collected by Mr A. Croall at Montrose Links so far back as April, 1855, but I am unable at present to identify it.—W. H. Pearson.

Botanical News.

Articles in Journals,—September.

Bot. Zeitung.—A. Morgen, "On the process of assimilation in the germinating cress (*Lepidium sativum*)."—O. Drude, "On the structure and systematic position of the genus *Cardulovica*."—Id., "Selected examples illustrating the structure of the fruit of Palms." (tt. 5, 6.)—Rostafinski, "Answer to Reinke."

Flora.—H. de Vries, "On longitudinal Epinastie."—H. Christ, "Forms of *Rosa* observed in 1876."—F. de Thuemen, "Fungi austro-africani" (contd.)—F. Arnold, "Mosses of the French Jura."—S. Schulzer v. Muggenburg, "Mycological Notes."

Hedwigia.—J. Schroeter, "*Peronospora obducens*, nov. sp."

Oesterr. Bot. Zeitschhr.—J. Freyn, "*Bellevalia Hackeli*, nov. sp."—B. Stein, "*Saxifraga Forsteri* (*cæsia* × *mutata*").—F. Hauck, "Algæ of the Adriatic" (contd).—A. Kerner, "Distribution of Hungarian plants" (contd.).—W. Voss, "Mycology of Carniola."—L. Menyharth, "*Melilotus*-species of Waldstein and Kitaibel" (contd.).—S. Schank, "Botany of the neighbourhood of the Kanalthal in Carinthia."—F. Antoine, "Botany of the Vienna Exhibition" (contd.)

Magyar Novénytanilopok.—"Stephen Hales" (with portrait).—H. A. Weddell, "*Urticaceæ* Herb. Linnæani."—L. Simkovics, "Flora of Buda-Pesth and its vicinity" (contd.).

Botaniska Notiser.—V. A. Poulsen, "Development of the pulp in *Citrus*."—J. E. Zetterstedt, "*Carex Schreberi* and *Polystichum Oreopteris* near Wisingsho."

Ann. des Sc. Nat. (ser. 6, iv, pt. 3).—N. Sorokine, "On the structure of *Crocisporium torulosum*" (tab. 6).—J. Wiesner, "Researches on the influence of light and of radiant heat on the transpiration of plants."—P. P. Deherain, "Notes on the preceding."—P.

van Tieghem, "On the digestion of albumen."—Fischer de Waldheim, "On the *Ustilagineæ* and their nourishing plants"

Journ. Linn. Soc. (no. 92, Sept. 25).—J. G. Baker, "On a collection of Ferns made by Miss H. Gilpin in the interior of Madagascar."—G. Henslow, "On the causes of the numerical parts of plants."—J. M. Crombie, "Lichens of the *Challenger* Expedition."—R. J. Lynch, "Note on the Blimbing (*Averrhoa Bilimbi*, Linn.)."—P. F. Reinsch, "Contributiones ad floram algarum aquæ dulcis Prom. Bonæ Spei" (tab. 6).—W. P. Hiern, "On the peculiarities and distribution of Rubiaceæ in Tropical Africa" (tt. 7, 8).

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New Books.—O. Penzig, "Untersuchungen über *Drosophyllum lusitanium*, Link." (Breslau.)—F. von Mueller, "Introduction to Botanical Teachings at the Schools of Victoria." (Melbourne.)—C. V. Nägeli, "Die niederen Pilze in ihren Bezeihungen zu den Infectionskrankheiten und der Gesundheitspflege." (Munich.)—O. Brefeld, "Botanische Untersuchungen über Schimmelpilze. III. Basidiomyceten." (Leipzig. 11 plates.)

Baron von Mueller has completed his "Descriptive Notes on Papuan Plants," by the publication of an Appendix containing those recorded by Blume, Miquel, and Scheffer, and some additions, including *Myrtella*, a new genus of *Myrtaceæ*, founded on two species collected by Beccari. We are glad to observe that the first step towards reinstating Baron von Mueller in his former position, as Director of a properly constituted Botanic Gardens, has been taken by the recommendation of the Board appointed to consider the matter, and this we hope the Government of Victoria will carry into effect.

In the "Linnæa" O. Böckeler has at length concluded the very extended accounts of the *Cyperaceæ* of the Royal Herbarium at Berlin, and Dr. E. Goeze, late of Lisbon, but now of Greifswald, commences an account of the vegetation of Portugal.

In the "Zeitschrift für Ethnologie" is a memoir on the useful plants of the ancient Egyptians, read so long back as 1871 by the late A. Braun under the title of "Die Pflanzenreste des Ægyptischen Museums in Berlin." It is now edited by Drs. Ascherson and Magnus, and contains much interesting matter.

The 400th anniversary of the foundation of Upsala University was made the occasion of a great festive celebration, extending from September 4th to 8th. The King in person presided, and the whole passed off with unusual brilliancy and success.

The new building for the herbarium at Kew has been some time completed, and the removal of the collections is being rapidly effected.

A memorial signed by P. Ascherson, A. Bastian, Beyrich, E. Du Bois-Reymond, C. Bolle, Borchardt, Curtius, Ewald, Garcke, R. Hartmann, A. W. Hofmann, L. Kny, C. Koch, Kronecker, Lepsius, P. Magnus, v. Martens, Mommsen, W. Peters, Pringsheim, Roth, W. Siemens, Virchow, Weber, M. Websky, L. Wittmack, Zellers, asking for assistance in the erection of a bust of Professor Alexander Braun in the Berlin University has been printed by several Continental botanical magazines. Subscriptions for this purpose are to be sent to the office of Messrs Siemens and Halske, Markgrafenstrasse 94, Berlin.

Original Articles.

CHARA FRAGIFERA, *Durieu*, AS A BRITISH PLANT.

By Henry Trimen, M.B., F.L.S.

(Tab. 192.)

The discovery of this *Chara* in England was made by Mr. John Ralfs, of Penzance, so well known for his algological researches. In the early summer of the present year he collected specimens differing from *C. fragilis* in being diœcious, and, unable to refer them to any species in Kützing's or Babington's works, he forwarded one to the latter botanist. Prof. Babington informed him that so far as appeared, the plant agreed well with descriptions of *C. fragifera*, and advised an examination of the roots for the white lobulated bulbils so characteristic of that species. This quickly revealed their existence, though in no great abundance, and buried in the mud. I am indebted to Mr. Ralfs for fresh specimens (unfortunately collected too late in the season), from which the following description and accompanying figure have been made. The locality whence they were obtained was a peaty pool at Chy-an-hal, near Penzance, Cornwall, where they grow much interlaced and mixed with confervoid Algæ. A much smaller and more delicate form has been met with by the same botanist in a pond on Lizard Downs and also at Tresco, Scilly Islands.*

Chara fragifera, *Durieu in Bull. Soc. Bot. de France* xvi., p. 185 (1859).—*Diœcious.* Stems 6-12 ins. long, considerably branched, *very flexible, never incrusted or brittle*, slender, striate, coated with about 20 (16-24) unequal tubuli, entirely without papillæ or spines, *bright green*; radical tubes simple (not coated), delicate, hyaline, thickened at the nodes and forming there *large, compound, white, solid, spheroidal bulbils reaching* $\frac{1}{8}$ *inch in diameter, and lobulated, mamillated or verrucose on the surface.* Internodes very long; nodes somewhat thickened; branches seven or eight in a whorl, elongated, simple, *very delicate and confervoid in character*, lax, spreading, slightly curved inwards but not connivent, with about fifteen (or more) nearly equal, short, striated joints; the terminal one very short, not coated, sharply pointed. Antheridia (globules) solitary, on the lower joints of the branches, bright orange; bracts minute, tooth-like. Nucules numerous, solitary, on the lower joints of the branches, with 1-3 small, sharp-pointed unicellular bracts at the base, which are *about half the length of the nucule*, ovate-oblong, red at first, afterwards nearly black, with nine or ten spirals; cells of the corona short, blunt, not connivent.

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* A specimen which probably ought to be referred to *C. fragifera* was shown me recently by the Rev. H. E. Fox, who collected it last year from a pond at Marazion, Cornwall, near the railway station.

The very delicate, slender and flexible character, diœcism, and large compound bulbils—compared by their first describer to white strawberries in miniature, whence the name of the species—would seem sufficient to distinguish this from all the British Charas. The bulbils are said to be never absent, though less abundant on the male plant.

C. fragifera is, no doubt, truly diœcious, and it is this character that must be mainly relied on to separate it from *C. fragilis*. The slender non-crusted forms of this variable species which have been called var. *capillaris*, Kütz., var. *tenuifolia*, A. Br., *C. capillacea*, Thuill., *C. leptophylla*, A. Br., &c. are often very similar in the character of their stems and branches to *C. fragifera*. From the fugacious nature of the antheridia also, specimens collected late in the season may appear to be wholly female. Whether the bulbils will afford a certain distinction appears doubtful, if the plant issued in Nordstedt's and Wahlstedt's Exsiccata (no. 119) from Christiansand, Norway, be rightly referred by them to *C. fragilis*. This has large compound bulbils at the basal nodes by no means unlike those of *C. fragifera*. The bracts of the nucule are short in all the specimens of *C. fragifera* examined, whilst most of the slender varieties of *C. fragilis* have long bracts, frequently much exceeding the nucule (var. *longebracteata*, A. Br.); but this is not a character of much constancy in the genus, and therefore ought perhaps not to be strongly insisted upon.

The only certainly known localities for *C. fragifera* are in Western France. There it seems to have been first distinguished about 1825 by M. Guilland, who collected it in the lake of Miunizan (Landes); the specimens were referred by Des Moulins to *C. galioides*, DC. It was not till 1859 that M. Durieu de Maisonneuve, after full opportunities of observation of the living plant for several years, described and distinguished *C. fragifera* as a species.* He records it as very abundant in fresh-water ponds with a sandy bottom near the coast in the Departments of Gironde and Landes, especially in the lakes of Cazau and Canau. It has since been found much more inland in the Departments of Vienne and Haute Vienne by the Abbé Chaboisseau (Bull. Soc. Bot. France x., p. 300), and in that of Loire-et-Cher, by Mr. E. Martin, as well as in several places in the North-west Departments of Finistère, Cotes-du-Nord, Ille-et-Vilaine, Loire-Inférieure, and Deux-Sèvres. It does not appear to reach as far east as the longitude of Paris.

Specimens have been published in the Exsiccata of Billot, no. 3273, and of Braun, Rabenh. and Stizenb., nos. 73a and 73b. There is no published figure.

The bulbils of this species, and indeed of the *Characeæ* generally, deserve a careful study. They have as yet been observed in but few,

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* M. Durieu considered the *C. connivens* of Brébisson's "Flore de la Normandie," ed. 2, p. 336 (1849), to be the same as *C. fragifera*, and not the true *C. connivens*, Salzm., which was thought to grow only in N. Africa. M. Chaboisseau has, however, recently shown (Bull. Soc. Bot. France xviii., pp. 148, 1871), that *C. connivens* occurs in several parts of the west of France, and also near Versailles, and gives a good figure of the plant (tab. 1) from the pencil of M. Max Cornu (see also Lloyd "Flore de l'Ouest de la France," ed. 3 (1876), p. 393.)

D Blair, ad nat. del et lith

Chara fragifera, *Dur.*

Mintern Bros. imp.

and it is not known whether they are of universal occurrence under suitable conditions, or are restricted to certain species. It is probable that all those species at least which present enlargements of the lower nodes may produce bulbils. The extent to which increase is effected by this asexual process has not been investigated; the copious production of bulbils in *C. fragifera* does not appear to lessen the amount of nucules. Nor is the significance of the two kinds of bulbils understood; are the minute globular unicellular egg-like bulbils (so abundantly produced by *C. alopecuroides* for instance) of the same nature as the large lobulated multicellular ones full of starch-granules found in the present species? Cultivation might decide such points as these, and *C. fragifera* was found by M. Durieu to grow readily from the bulbils.

The structure of the bulbils of several species is described by Montagne in a memoir in the Annales des Sciences Nat., ser. 3., xviii., p. 65, and by Clavaud in the Bull. Soc. Bot. France x., p. 137; in the plate accompanying the latter paper those of *C. fragifera* are figured.

In collecting Charas, the radical tubes and rhizoids should be always carefully taken up with the specimens.

Description of Tab. 192.

Chara fragifera, Dur. Drawn from specimens collected by Mr. J. Ralfs, near Penzance. 1. A female plant, nat. size. 2 and 3. Transverse sections of the stem. 4. Termination of a branch. 5. A whorl of branches. 6. A globule. 7. A nucule. 8. A bulbil.

TWO NEW SPECIES OF *LYSIMACHIA*.

By Henry F. Hance, Ph.D., etc.

791 1. Lysimachia (*Lubinia*) Fœnum-græcum, *sp. nov.*—Eglandulosa glaberrima, caule decumbente longe repente fibras radicantes copiosas emittente compresso-tetragono alis 4 angustis marginato, foliis alternis ellipticis margine crispo-undulatis utrinque acutis papyraceis tenuiter penninerviis 2½ poll. longis 10-13 lin. latis in petiolum semipollicarem alatum cuneatim abeuntibus, floribus axillaribus solitariis, pedicellis gracilibus apicem versus paulo incrassatis 12-15 lin. longis, sepalis anguste lanceolatis exquisite acuminatis 4 lin. longis, capsula sphærica levi 2 lin. diametro stylo filiformi trilineali rostrata.

Herba mire ac perenne Fœnum græcum perolens, a Sinis in usum medicinalem et odorarium vulgo adhibita, nascitur in montibus elatioribus provinciæ Kwangsi, unde ab autochthonibus Miao tsz dictis defertur. Specimina debeo benevolentiæ Rev. R. H. Graves. (Herb. propr., n. 19587.)

Although the flowers are unknown, there can be no doubt that this is most closely allied to *L. ramosa*, Wall. !,* from which it is readily distinguishable by its habit, by the shape of its leaves and sepals, its smaller fruit, and particularly by its persistent odour of fenugreek, so strong that the mere bringing of the herbarium sheet on

* Klatt, Die Gatt. *Lysimachia*, tab. 17.

which my specimen is mounted into a large room perfumes it in an overpowering manner. The plant is universally used by the women for scenting hair-oil, and generally in perfumery and medicine, and I should think it might be profitably employed in the compounding of cattle-foods. *Lysimachia* is one of the last genera in which one would have expected to find such a powerful aroma, and the precise cause of this and other more or less similar odours deserves careful chemical investigation. That of *Dipteryx*, *Hierochloe*, *Asperula*, *Melilotus*, and *Anthoxanthum*—"New-mown hay"—is due to the presence of coumarin, in combination with hydrocoumaric acid;* but, according to Flückiger and Hanbury† the nature of the odorous principle of fenugreek has not hitherto been determined. Various other plants exhale a similar aroma. The drying frond of *Polypodium phymatodes*, Linn., exhales an unsurpassingly sweet, hay-like smell; *Desmodium retroflexum*, DC., is quite scentless whilst alive, but the dried plant smells like extract of liquorice, or fenugreek, and so does the growing plant of *Mallotus Furetianus*, Müll.-Arg. Indeed, as I have elsewhere observed, I have repeatedly, whilst botanising, been attracted to it by the sense of smell alone, when I could not for some time discover the shrub itself. A specimen of *Argyrothamnia brasiliensis*, Müll.-Arg., in my herbarium, gathered by Riedel, and which must therefore, I suppose, be from thirty to fifty years old,‡ still fills the drawer in which it lies with its fenngreek-like fragrance.

905 2. LYSIMACHIA (*Cilicina*) ALFREDI, *sp. nov.*—Caule erecto rubente pube tenui glanduloso-tomentoso, foliis oppositis ternisve summis confertis lanceolatis apice acutiusculis basi in petiolum cuneatim attenuatis venis inconspicuis utrinque pube brevi tomentosis lucique obversis glandulis nigris breviter linearibus creberrimis obsitis incl. petiolo 6-10 lineali 3-3½ poll. longis, floribus in racemum terminalem abbreviatum dispositis pedicello lineali suffultis singulo bractea trulliformi unguiculata ciliata foliis quod ad indumentum et glandulositatem simili stipato, sepalis anguste lanceolatis acutiusculis pilosis et atro-glandulosis 3 lin. longis, corollæ 5-partitæ flavæ 7 lin. longæ lobis lanceolatis acutis crispulo-pilosis lineis nigris glandulosis percursis, staminibus corolla duplo brevioribus ad medium usque in cupulam dense glandulosam coalitis filamentis filiformibus parce glandulosis, ovario styloque stamina excedente pilosis.

In ditione Fuchauensi, m. Maio, 1873, detexit filius Alfredus. (Herb. propr., n. 17884.)

A handsome species, nearest in affinity to *L. cuspidata*, Bl. (?),§ but differing by many characters, and especially by its extreme glandulosity and conspicuous broad bracts. It is singular that so showy a plant should not hitherto have been noticed; but I have ascertained that nothing like it exists in the very rich Chinese collections of the Petersburg herbarium.

The following *Lysimachiæ* are represented in my herbarium

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* Church, in Seem. Journ. Bot. ix., 18.
† Pharmacographia, 151.
‡ For the dates of Riedel's travels, see Lasègue, Musée Delessert., 478.
§ Klatt, op. cit, t. 20.

by Chinese specimens, and I append the localities where they were gathered.

1. *Lysimachia* (*Ephemerum*, *Bernardina*) *barystachys*, Bl.—Ta lien wan (Swinhoe), Peking (Williams, Bretschneider, allique). Li Tao (Mayers). Chi fu (Forbes).

2. *L.* (*Ephemerum*, *Bernardina*) *candida*, Lindl. (= *L. samolina*, Hance).—Prov. Cantonensis.

3. *L.* (*Ephemerum*, *Bernardina*) *Fortunei*, Maxim.—Juxta Cantonem (Parry, Sampson).

4. *L.* (*Ephemerum*, *Coxia*) *decurrens*, G. Forst.* (= *L. multiflora*, Wall., *L. consobrina*, Hance).—Formosa (Oldham). Prov. Cantonensis (Sampson).

5. *L.* (*Nummularia*) *Christinæ*, Hance.—Ningpo (Swinhoe).

6. *L.* (*Lubinia*) *Fœnum-græcum*, Hance.—Kwangsi.

7. *L.* (*Lubinia*) *spathulata*, Klatt.—Ta lien wan (Swinhoe). Amoy (Sampson).

8. *L.* (*Cilicina*) *japonica*, Thunb.—Secus fl. Lien chau. prov. Canton. Feb., 1877. (T. L. Bullock)

9. *L.* (*Cilicina*) *grammica*, Hance. Chiukiang (Hay).

10. *L.* (*Cilicina*) *alpestris*, Champ.—Hongkong.

11. *L.* (*Cilicina*) *cuspidata*, Bl.†—Chi fu (Swinhoe, Stuhlmann).

12. *L.* (*Cilicina*) *Alfredi*, Hance.—Fuchau.

13. *L.* (*Apochoris*) *pentapetala*, Bunge.—Ta lien wan (Swinhoe). Peking (Williams aliique). Although *Apochoris* is admitted, evidently with hesitation, by Dr. Hooker in the "Genera," it seems to me that the great differences as regards stamens in the various species of *Lysimachia*, some with the filaments quite free, others having them united into a very short ring, whilst in others again they are conjoined for half their length into a cup, should warn us against attaching undue weight to the circumstance that in the present species the petals are scarcely coherent, for we ought consistently to allow of similar differences in the amount of union in all the floral verticils. In habit it is extremely like *L. candida*, and I do not think should be separated generically.

I have referred the above species to the sections established by Klatt, in his monograph of the genus; but these seem to me needlessly multiplied, and rather loosely defined.

ON SOME QUESTIONS OF BOTANICAL NOMENCLATURE.

By J. Ball, F.R.S.

Absence from England prevented me from seeing at the time the letter from M. Alphonse de Candolle published in your August number (p. 242), with the editorial remarks appended to it, and the

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* See Ferd. v. Mueller, Contrib. to Phytogeography of New Hebrides, 17.

† By this I mean the plant described and figured by Klatt, which, however, Miquel declares (Ann. mus. bot. Lugd.-Bat., iv., 144) to be "toto cælo diversa," from Blume's species.

observations of M. Caruel on the same subject in the succeeding number (p. 282); but you will perhaps allow me, though somewhat late, to add a few words to the controversy.

To most of the general propositions laid down by my friend, M. Caruel, I can make little objection, but I hold that his practical conclusions, so far as they differ from those of M. de Candolle, have a tendency to aggravate a mischief, already very serious, which should be resisted by all true lovers of science. It is perfectly true that the mention of an author's name after that of a given species is no testimony to that author's scientific distinction, and is in truth no more than a condensed form of bibliographic reference to guide the reader to the work wherein the plant is described, or its place in the systematic order defined; but it is at the same time a notorious fact that the desire to affix their own names to new specific or generic appellations is a besetting weakness with a majority of naturalists, and especially with those who have least contributed to the real progress of science. It is further true that between the indulgence of this form of vanity in some writers, and the negligence, or waywardness, or caprice of others, the multiplication of synonyms has become a serious evil, bewildering to the student, and creating needless trouble and inconvenience to every worker. One of the most frequent occasions for adding to the mischief arises when a writer proposes to transfer a plant already known and described from one genus to another.

M. Caruel maintains that, inasmuch as the previous name consisted of two words coupled together, that name falls to the ground when the generic designation is removed, and that the writer is free to select any new specific name he thinks proper. He admits, indeed, that it may be usually advisable to retain the same specific adjective, but denies that this can be made an obligation. In furtherance of this view, M. Caruel maintains that the practice he advocates has been universal "from Linnæus downwards to a very recent date," and that confusion would be created if it were necessary to revert in such cases to the older specific name. It would be more accurate, I think, to say that instances of the abuse in question occur in the writings of many eminent men since the time of Linnæus, and that it is owing to the want of some definite rule on this and other points of practice, and the consequent mischief and inconvenience, that the attempt has been recently made to establish, by the general agreement of the most eminent men of science, rules that may serve as guides for future use.

As regards specific names which, though not the most ancient, have been generally received in works of authority, the case falls under the maxim "fieri non debuit factum valet." It is, I think, an error to seek to disturb a name sanctioned by the general usage of botanists, even where no change of generic name has intervened, merely because the accepted name is not the first published. But, keeping in view the real needs of our time, and with regard to names that have not attained to general and wide-spread recognition, I think that no practical objection has yet been urged against the rule which, though not, I believe, formally enunciated, is certainly supported by the high authority of M. Alphonse de Candolle—that when a botanical

writer proposes to transfer a plant from one genus to another he is bound to retain the previous specific designation, unless upon manifest grounds this should appear unfitting or erroneous. The only common case where it is legitimate to give a new specific name is where the old designation is already employed for a species in the genus to which a plant is transferred. The other cases should, I conceive, be limited to instances where the name implies positive error and misstatement of fact, and would arise with equal force if the generic name remained unchanged. Such cases arise where from misinformation a plant has received a geographical designation from a country with which it has no real connection, or where the name describes some attribute that is absolutely and entirely wanting. But to hold that because a specific name is occasionally inaccurate or inappropriate it is lawful to change it, would simply open the door to endless confusion, and remove all prospect of ever attaining a stable system of nomenclature.

The whole matter at issue will be best illustrated by an example —the first that happens to occur to me. Let us take the pretty little plant, very like a miniature edition of the common *Arenaria rubra* of Linnæus (*Spergularia rubra* of most modern botanists), which was first described and published by Gussone under the name *Arenaria diandra*. It was next described by Bunge in Ledebour's "Flora Altaica" as *Arenaria salsuginea*. It was next given to the public under the name *Spergularia patens* of Hochstetter in Schimper's published collections of Arabian plants. Soon after it was again published as *Spergularia salsuginea*, by Fenzl, in Ledebour's "Flora Rossica," and more recently as *Lepigonum salsugineum*, by Kindberg, in his monograph of this group. Finally, this vexed species has received what it may be hoped is its permanent designation as *Spergularia diandra* in Boissier's "Flora Orientalis." Now observe the consequences of adopting M. Caruel's views. Hochstetter when he placed this plant in the genus *Spergularia* was (if these prevail) no way bound to retain the specific names *diandra* or *salsuginea* which the plant had previously received, and therefore by those who accept the genus Spergularia it must be called *Spergularia patens*. But there is a controversy as to the respective claims of the generic names *Spergularia* and *Lepigonum*, and those who adopt the latter would on the same principle be bound to call the plant *Lepigonum salsugineum*, because Kindberg adopted that name, although admitting the general rule that the older specific name is entitled to preference. He rejects it in this instance because, although the flowers are generally diandrous, they have sometimes three and rarely ten stamens. But someone else may point out that, although in some countries this species specially affects stations where the soil contains soluble salts, there are others where it exhibits no such preference, and on this ground reject the name *salsuginea* as incorrect. I have omitted some further grounds of controversy that might be urged as to this particular plant, but think I have said enough to show that if the rule advocated by M. Alph. de Candolle be not stringently enforced we shall, in hundreds of cases, not only perpetuate existing confusion, but open the door to further mischief in the future.

There is a further point as to which I likewise differ from M.

Caruel. He intimates his aversion to the practice of quoting in the first instance the name of the author who first described the species, with the addition in brackets of the genus to which he referred it. I consider it not one of the least services rendered to science by the publication of Boissier's "Flora Orientalis," that it has thrown the weight of so much authority in favour of this slight but salutary innovation, which is a logical consequence of the rule of retaining the original specific name. If in the case above mentioned I follow Boissier in writing *Spergularia diandra*, Guss. (sub *Arenaria*), I express the fact that the species was first distinguished and named by Gussone as an *Arenaria*. The manifest advantage of this method is that it removes the temptation, unfortunately so seductive to human weakness, of seeing the name of someone who may have added nothing to our knowledge of the plant attached to it for all future time.

I beg to add a few words on a different but cognate subject. When a writer has satisfied himself that two or more species admitted by preceding authors are in truth forms of the same species, the question arises whether he is entitled to assign a new specific name to the collective species which is to include the others. While adhering to the principle that new specific names for plants already known and described should be admitted only in extreme cases, I think it must be admitted that in some of those I refer to the balance of convenience and clearness inclines towards the admission of a new name. To give an example—when Spach came to the conclusion that six species of *Cistus* established by Linnæus (*C. albidus*, *C. crispus*, *C. villosus*, *C. pilosus*, *C. incanus*, and *C. creticus*) should all be united, it appears to me that he was justified in proposing the new name *C. vulgaris* for the collective species, and that those who accept his conclusion should adopt the latter name, because no good reason can be given for selecting one Linnæan species as the typical form. When another writer who has much studied the same genus (M. Willkomm) comes to a conclusion different from that of Spach, and holds the first two species above enumerated to be distinct, while desirous to unite into one the remaining four, the case is less clear, but I incline to agree in the propriety of applying a new specific name to the collective species thus defined, and, as I agree in M. Willkomm's conclusion, I should feel bound to use the name *C. polymorphus*, Willk., to distinguish it. But if in the instance here given one specific name—say, *C. villosus*—had been adopted in the first instance, by Linnæus, and the designations *pilosus*, *incanus*, and *creticus* had been applied by subsequent writers to distinguish what I held to be forms of the same species, I should consider it right to retain for this the original name *C. villosus*, even though the latter adjective should not be appropriate to some forms of the species.

NOTES ON A FEW NORTH DEVON PLANTS.

(CHIEFLY NEW RECORDS.)

By the Rev. W. Moyle Rogers.

Having this year spent three weeks (from the middle of August onwards) on the north Devon coast, and found there several noteworthy plants, I have thought that some record of them might prove interesting to the readers of the Journal. The ground has evidently been only partially worked, and the present is but a small contribution towards a more thorough exploration of it. The country is, as everyone knows, very hilly, my walking powers are not great, and the weather during my stay was mostly wet and windy, preventing altogether several promising expeditions that I had planned, and going far to spoil some of those I managed to make. So of necessity most of my rambles were confined to the cliffs in the immediate neighbourhood of Ilfracombe, extending to Lee on the one side, and to Watermouth on the other. I was fortunate, however, in being able to spend several hours of two lovely days (Aug. 23rd and Sept. 5th) on Braunton Burrows, the two ends of which I searched with some completeness.

Most of the rare and otherwise interesting plants of this famous botanical ground are so well known, that of some of them—*e.g.*, *Scirpus Holoschœnus*, *Teucrium Scordium*, *Matthiola sinuata* (Saunton Sands end), *Viola Curtisii*, *Erigeron acris* and *Chlora perfoliata* (both rare plants in the extreme south-west), and *Juncus acutus*—it will be enough for me to say that they were all there this year in great abundance, except the last, which I met with only very sparingly in one hollow. A few other rarities from the same station will be referred to in their natural order in the following list.

I may add that I also paid visits, but only provokingly hurried ones, to Lundy Island, Mortehoe, Woollacombe Sands, and Instow.

None of the plants named in this list have North Devon stations given for them in "Flora Devoniensis." Mr. Ravenshaw's List* is quoted as often as it contains such stations.

Ranunculus Drouetii, Schultz. "A form growing upon mud." This is what Prof. Babington considers a dwarf Ranunculus to be which I found in one of the damp sandy hollows of Braunton Burrows. There were only some half-dozen specimens of it (with a few plants of *Chenopodium rubrum*) just at the bottom of the bare sandy basin, where water had stood, and the largest of them (the only one with fruit as well as flower) could not have been more than from 2 to 2½ inches high.

Diplotaxis muralis, DC. Ilfracombe. As a weed in garden gravel walks, and in one place on the cliffs. Probably only casual. Not recorded for North Devon in Topog. Bot.

Silene anglica, Linn. By Braunton Burrows. One plant. Not recorded for North Devon in Topog. Bot.

Sagina apetala, Linn. The segregate. Braunton village, on a

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* "A List of the Flowering Plants and Ferns growing wild in the County of Devon." By Rev. T. F. Ravenshaw. (T. Bosworth.) The edition quoted in this paper is the "Re-issue, with Supplement," published in 1872.

wall. The only place where I met with it. Not recorded for North Devon in Topog. Bot.

S. ciliata, Fries. The segregate. Abundant all along the coast. Not recorded for North Devon in Topog. Bot.

Spergularia rupestris, Lebel. Ilfracombe, &c. Very abundant everywhere by the sea. The only *Spergularia* that I saw.

Potentilla procumbens, Sibth. Lundy Island. Growing in great profusion down the bank by the roadside, not far from the top of the island. Not recorded for North Devon in Topog. Bot.

Hypochæris glabra, Linn. Braunton Burrows, near the lighthouse. Here, as at Exmouth and on Dawlish Warren, this plant throws out on all sides creeping stems, apparently ready to root themselves later in the season. Is this its usual habit on sandy ground?

Scrophularia Scorodonia, Linn. On Lundy Island, among the rocks, not far above the landing place. Large much-branched plants with narrower and more tapering leaves than I have seen in Cornish and Channel Islands specimens. In Mr. Ravenshaw's "Supplement" occurs the following note:—"‡ *Scrophularia vernalis* (L.). Lundy Island. Above the landing place. *Rev. C. Kingsley.*" I did not remember this when on the island, and so did not look for *vernalis*, but from the station named Kingsley would certainly seem to have mistaken *S. Scorodonia* for *S. vernalis*, a most unlikely plant to find in Devonshire. Not recorded for North Devon in Topog. Bot.

Nepeta Cataria, Linn. Near Lee, and on Braunton Burrows. Lacks personal authority for North Devon. in Topog. Bot.

Marrubium vulgare, Linn. Braunton Burrows, widely spread. ("Braunton," North Devon Handbook, quoted in Mr. Ravenshaw's List.) One of the few stations (the cliffs between Lulworth and Weymouth, and near Freshwater, Isle of Wight, are two others) where this plant has looked to me like a native.

Statice binervosa, G. E. Sm.; *b. intermedia*, Syme. Cliffs north of Woollacombe Sands and by Braunton Burrows. ("*Statice spathulata*, Hook. Woollacombe," Ravenshaw.) This (*b. intermedia*) was the only form (and all the specimens were well marked) of *Statice binervosa* that I met with in North Devon. On the south coast, on the other hand, I have seen only *a. occidentalis*, Lloyd.

Plantago Coronopus, Linn. On the top of Lundy Island I came on a starved form of this species, new to me, having narrow *undivided* leaves, white with silky hairs, and very short spikes, which at first sight I took to be the hairy form (*b. hirsuta*) of *P. maritima*, L. But close by I soon found other specimens with toothed leaves, and otherwise intermediate between this extreme form and ordinary *P. Coronopus*. Mr. A. Bennett (of Croydon) has sent me a very similar plant gathered by him on the N. coast of Norfolk, and with it the following extract from Sir J. E. Smith's Engl. Fl. i., p. 216: "*P. Coronopus*, β. Plantago gramineo folio hirsuto, minor, capitulo rotundo brevi. Dill. in Raii Syn., 316." Sir J. E. Smith adds, "They" (*i.e.*, the leaves) "are scarcely ever so starved as to be undivided, answering to var. β."

Chenopodium rubrum, Linn. Braunton Burrows, as recorded in Mr. Ravenshaw's List. Abundant at both ends. Lacks personal authority for North Devon in Topog. Bot.

Atriplex angustifolia, Sm. Ilfracombe. Not recorded for North Devon in Topog. Bot.

A. portulacoides, Linn. Instow and neighbourhood. Not recorded for North Devon in Topog. Bot.

Rumex pulcher, Linn. Ilfracombe, Capstone Hill. Abundant. Not recorded for North Devon in Topog. Bot.

POLYGONUM MARITIMUM, *Linn.* Braunton Burrows, 5th Sept. An extreme form at this its (as at present recorded) northern limit, approaching *P. Raii*, Bab., in its herbaceous stem, and (especially in the younger plants) rather weakly-nerved stipules. I found it in fairly good quantity in two of the sandy hollows near the sea, by huge tufts of *Scirpus Holoschœnus*, but was unable to search for it further. As it grows here, half buried in the sand, it is an exceedingly pretty plant with its intensely glaucous foliage and crowded long white-tipped brown-based stipules. It seems hardly likely to become extinct in this newly discovered station, as it appears to have done on the Hampshire coast. Not in Topog. Bot.

Epipactis palustris, Crantz. This beautiful Orchid, so rare in S.W. England, is mentioned in Mr. Ravenshaw's List as having been found on Braunton Burrows by Mr. Ed. Lees and Rev. C. Scriven. It was growing in considerable quantity in one of the sandy hollows this year, but I could find only two plants in flower (just opening on Sept 5th), the rabbits having eaten down the rest.

Scilla autumnalis, Linn. On the cliffs between Woollacombe Sands and Mortehoe, as reported in Mr. Ravenshaw's List. Not recorded for North Devon in Topog. Bot.

Holcus mollis, Linn. About Ilfracombe and Watermouth, frequent. Not recorded for North Devon in Topog. Bot.

Sclerochloa loliacea, Woods. Cliffs at Mortehoe. Lacks personal authority for North Devon in Topog. Bot.

Triticum junceum, Linn. The segregate. Woollacombe Sands. Neither division of the county is included in those given for this segregate in Topog. Bot. In South Devon it is very abundant at Exmouth and on Dawlish Warren.

Cannabis sativa, Linn. Chambercombe. One plant near a farmyard. Casual.

Setaria glauca, Beauv. Ilfracombe. A large, many-stemmed plant, near the limekiln. Casual.

In addition to the plants named in the above list, I may here mention together *Sagina maritima*, Don, Ilfracombe; *Ulex Gallii*, Planchon, Lundy Island and near Ilfracombe; *Honkeneya peploides*, Ehrh., Braunton Burrows; *Sinapis alba*, Linn.; and *Carduus tenuiflorus*, Curt., both Ilfracombe; all of which lack personal authority for North Devon in Topog. Bot., but have some station in that vice-county given for them in Mr. Ravenshaw's List.

SOME CONTRIBUTIONS TO PLANT-CHEMISTRY.

By A. H. Church.

(*Continued from Vol. V., New Series, p.* 75.)

13. *Coleus Verschaffeltii.*—The red colouring matter of this plant has been made the subject of a long continued investigation. By operating upon large quantities of the stems of the darker varieties of this species sufficient material was obtained for a fairly complete study of the chemical properties and composition of the curious substance to which these plants owe so much of their beauty. To the colouring matter when pure I have given the provisional name of *colein*, although I am inclined to think that it is identical with œnolin, from red wine, as well as with the substances anthocyan, erythrophyll, and cyanin, described by other chemists as extracted from blue and purple flowers of many kinds. The properties of colein are fully described in the Chemical Society's Journal for 1877.* The following is a highly condensed account of this substance.

Colein occurs abundantly in the dark parts of the stem of the plant. It occurs in the epidermal cells, and also in the parenchyma of the pith, but not in the fibro-vascular bundles nor in the cortex.

It is soluble in strong and weak alcohol; insoluble in ether. It yields a nearly colourless solution with alcohol; but on evaporation the colour returns. Pure colein occurs as an amorphous reddish-purple resinous mass, fusible in hot water, though but slightly dissolved thereby. Acids redden a solution of colein; alkalies turn it violet, indigo-blue, green, and, finally, yellow. Colein has the formula $C_{10}H_{10}O_5$, or some multiple of this; it yields salts with lead, barium tin, platinum, and other metals. It is probably the chief colouring matter of the majority of red, purple, blue, and violet coloured flowers. It appears to be present in many leaves (copper beech) and fruits (grapes). It is, however, perfectly distinct from the colouring matter of the leaves and root of the red Beet. I am in hopes of being able to determine its relation to other vegetable colouring matters, such as chlorophyll and curcumin.

14. *Fraxinus excelsior.*—A supply of flowers was obtained as they fell (slightly withered) from the tree in May, 1876. A determination of water would have been unsatisfactory, owing to the incipient drying of the sample, the results of the analysis are therefore calculated on the perfectly dry sample :—

	Per cent.
Carbon, hydrogen, and oxygen .	87·63
Nitrogen	4·37
Potash	3·15
Phosphorus pentoxide . . .	2·32
Silica	trace.
Lime	1·06
Sulphur trioxide and other ash-constituents	1·47
	100·00

* Vol, i., 1877, pp. 253-262.

Thus the total ash in the dry ash-flowers amounted to 8 per cent., which ash contained, when its constituents are calculated as per-centages—

Lime	13·22
Potash	39·42
Phosphorus pentoxide	28·98
Silica, magnesia, sulphur trioxide, &c., undetermined	18·38

On comparing these numbers with those obtained in the analysis of the female flowers of the Elm (Journ. of Bot., v. 73) it will be seen that the more valuable elements of plant-nutrition are alike abundant in both cases, although the present example is a still more striking one than that of the Elm. The contrast in composition between these ash-flowers and the leaf-scales of the Beech (*loc. cit.*) may be shown in the following manner, the materials analysed being assumed to be perfectly dry in both cases:—

Ash flowers contain 7·4 times as much *nitrogen* as Beech scales.
" " 7·7 " " *potash* "
" " 10·5 " " *phosphorus pentoxide* "

[In the account of Elm-flowers previously given in this Journal (*loc. cit.*, p. 73) an error of calculation occurred. The ash of Elm-flowers contains 5·62 per cent. of sulphur trioxide, while the per-centage proportion of this constituent in the perfectly dry substance of these flowers should read ·46, the lime and undetermined ash-constituents being 3·93.]

15. *Acer Negundo.* A variegated form of this tree was studied to see whether chemical analysis would throw any light upon the conditions which determine or maintain the white variegation of certain plants, and the presence or absence of chlorophyll. The experiments were begun too late in the season (17th September) to be complete or conclusive, but they already promise important results. White leaves or parts of leaves were gathered or torn and immediately weighed; green leaves or part of leaves were similarly treated. Such determinations of their differences as have been made are here shown.

Per-centage of	White parts.	Green parts.
Water .	82·83	72·70
Organic matter	15·15	24·22
Ash . .	2·02	3·08

The ash was thus constituted:—

Per-centage in ash of	White parts.	Green parts.
Potash .	45·05	12·61
Lime . .	10·89	39·93
Magnesia .	3·96	4·75
Phosphorus pent-oxide .	14·55	8·80

The above figures seem to show that the white leaves, or parts of leaves, of this Maple differ from the green leaves much in the same way that young leaves differ from old. In the former water is more abundant, while their ash is richer in potash and phosphorus pent-oxide, and poorer in lime. But other plants must be studied before any general conclusions as to the chemistry of variegation can be safely drawn. Such studies are in progress, and the results, thus far obtained, corroborate those which I have just given. It will be interesting to compare the chemistry of *albication* with that of *icterus* and *chlorosis*.

TWO NEW FERNS FROM JAPAN.

By J. G. Baker, F.L.S.

The two following Ferns in Mr. Bissett's first collection are, so far as I am able to ascertain, new species:—

Nephrodium (*Lastrea*) Bissetianum, *Baker*.—Stipe a foot long, with black linear scales, those of the base nearly an inch long. Lamina deltoid, a foot long, tripinnate or quadripinnatifid, membranous in texture, glabrous on both surfaces, the rachises clothed with black linear scales, from a bullate pale brown base, and under surface also with copious bullate scales. Lower pinnæ the largest, deltoid. Ultimate segments oblong. Veining pinnate in the ultimate segments. Sori medial. Involucre large, membranous, glabrous.

Hab.—Miyanosh'ta. May. Cutting like that of *N. spinulosum* and *N. Eatoni*. Remarkable for its copious and very peculiar paleæ.

1867 Polypodium (*Phegopteris*) oyamense, *Baker*.—Root-stock slender, wide-creeping, bearing a few small pale brown lanceolate scales on the exposed part. Stipe slender, naked, 2-3 in. long. Lamina deltoid, membranous, glabrous, naked, about 3 in. long, simply pinnatifid, cut down to the main rachis into linear-oblong pinnæ of which the lowest are the largest, and are obtusely lobed, principally on the lower side. Veins in pinnate groups opposite the lobes, veinlets fine, much-ascending, 2-3-jugate. Sori in a single row, midway between the midrib and margin of the pinnæ, placed on the middle of the lowest anterior veinlet of each group.

Hab.—Oyama. October. Remarkable for its small little-compound membranous, glabrous fronds.

BERMUDIAN FERNS.

By the Rev. Robert Hunter.

In a collection of wild plants made between 2nd August, 1863, and 7th May, 1865, by me in Bermuda, ten ferns occur. These were kindly named a few years ago by Mr. Baker, F.L.S., of Kew. They came too late for his edition of Sir William Hooker's "Synopsis Filicum"(1874), and as only one of the ten, *Acrostichum aureum*, is formally mentioned in that standard work as growing in Bermuda, their publication even at this remote date may not be without interest.

1. *Adiantum Capillus-Veneris*, Linn., variety? In fr. Warwick parish. September, 1863.

2. *Pteris aquilina*, L.; var. *caudata*, L.

3. *Asplenum Trichomanes*, L. Wood in Warwick parish. September, 1863.

4. *Nephrodium* (*Lastrea*) *patens*, Desv. In fr. Warwick. 1863.

5. *Nephrolepis exaltata*, Schott. In fr.

6. *Polypodium* (*Goniopteris*) *tetragonum*, Swartz? Without fruit and with forked veins. Walsingham, parish of Hamilton. March, 1864.

7. *P. pectinatum*, L. Walsingham, in fr. March, 1864.

8. *Acrostichum* (*Chrysodeum*) *aureum*, Presl. In a marsh, Warwick parish. In fr.

9. *Osmunda cinnamomea*, L. Warwick. In fr. March, 1864.

10. *O. regalis*, L. In a marsh, Warwick parish. March, 1864.

ON SOME HYBRID BRAMBLES.

By Dr. W. O. Focke.

Occupied in the study of the nearly inextricable conglomerate of European Rubi, I have endeavoured to obtain by different means an idea of the true relationship between the innumerable forms. Every one who has worked on the same subject must have asked, how far hybridisation might be capable of accounting for the numerous analogies and cross resemblances between the links of the whole group. I think that a series of experiments will in the end enable us to answer the question, and I have made an attempt to take the first steps in this direction.

Amongst the fruticose Rubi there are three closely allied forms, viz., *R. bifrons*, Vest., *R. villicaulis*, Koehl., and *R. gratus*, distinguished by me some years ago. They belong to the group of *Villicaules*, and have arcuate, angulate, more or less hairy stems without aciculi or setæ, rooting in autumn at the ends. The stamens are longer than the pistils, and after flowering bend together and cover the young fruit. In *R. gratus* the stem is decidedly angulate, the prickles short and moderately strong, the leaves digitato-quinate, the leaflets hairy and green on both sides, the inflorescence rather lax and leafy with scattered short prickles, the sepals in the fruit spreading or

somewhat erect, the pollen-grains nearly all of the same shape and size. The flowers and fruits are very large. In *R. bifrons* the stem is often rounded at the edges, the prickles straight, large, and strong, the leaves ternate or pedato-quinate, the leaflets quite smooth above, closely white-felted beneath, the panicle compound, in the upper part leafless, with strong and slender prickles, the sepals always reflexed, the pollen-grains partly irregular and shrivelled. The third form, *R. villicaulis*, is in most respects intermediate between the two others. It has the strong prickles and the reflexed sepals of *R. bifrons*, the digitate leaves and the hairy surface of the leaflets of *R. gratus*, the underside generally being more or less greyish. *R. villicaulis* is more variable than the allied types, but it is not connected with them by intermediate forms. All the three plants come true from seeds.

R. gratus is found to occur frequently in the north-western part of Germany, and probably will be met with also in the Netherlands, Belgium, &c. *R. bifrons* grows in Austria, Southern Germany, Switzerland, and a great part of France. The geographical range of *R. villicaulis* extends over nearly the whole of Germany, the North of France, England, and Southern Scandinavia.

Now, I have produced artificial hybrids by fertilisation of *R. gratus* with the pollen of *R. bifrons*. The males have strong prickles and reflexed sepals like *R. bifrons*, the under surface of their younger leaves is whitish or greyish, in the adult both sides are green and hairy. As they bear perfect fruits, I do not know how to distinguish them from true *villicaulis*. Even the colour of the petals is more whitish than in either parent, and is accurately the same as in the typical form of *R. villicaulis*. It cannot therefore be doubted that by crossing *R. gratus* and *R. bifrons* I have obtained a plant indistinguishable from the common *R. villicaulis*. Now the question arises, what is the widely distributed *R. villicaulis?* Is it indeed a constant race derived from a hybrid? It is not easy to understand how this can be the case, as *R. gratus* and *R. bifrons* grow scarcely anywhere at the same spot. In the greater part of Germany, where *R. villicaulis* is abundant, and probably also in England, there is never seen either of its supposed parents. These facts are very difficult to reconcile with the suggestion of the hybridity of this Bramble. On the other hand, there is a hypothesis which may explain the facts in another way.

Suppose the three plants are forms of the same species, *R. villicaulis* would be regarded as the type, and the two other races would stand as well-defined subspecies. Admitting that the hybrids produced by crossing the northern and the southern subspecies tend to return to the original type (viz., *R. villicaulis*), we find means to explain the experimental facts, and at the same time we escape the difficulty in the suggestion that a hybrid might have superseded in a considerable part of Europe both its parents. But I fear that in adopting this view we fall into other difficulties, considering that we never actually see a variability in *R. villicaulis* sufficient to explain the formation of such marked subspecies as *R. bifrons* and *R. gratus*. We find no connecting links between them and the supposed type. I do not know which of the above suggestions will prove to be the right one, but I am inclined to believe that the former comes nearer the truth.

Another experiment which seems to make evident the transition of a partly sterile hybrid into a well-known constant race is described in my "Synopsis Ruborum Germaniæ," p. 46.

I have also succeeded in producing hybrids by fertilisation of *R. Idæus*, L., and *R. Bellardi*, Wh. et N., with pollen of *R. cæsius*, L. The products are quite sterile, and that of *R. Idæus* resembles the spontaneous hybrids described as *R. idæoides*, *R. cæsio-Idæus*, etc.

Finally, it is of some interest to state that I have raised a few seedlings from the curious sport of *R. Idæus* named by Prof. Babington *R. Leesii*. It had already been described in 1811 by Willdenow (Berl. Baumz., ed. 2, p. 409) under the name of *R. obtusifolius* as a Linnean plant, and in 1839 by Arrhenius under the name of *R. Idæus anomalus*, from Sweden. The fruits are generally abortive, because the ovaries usually are imperfectly closed. Seeds, therefore, are very rare, but it seems, as far as I have seen, that the young plants raised from them preserve the peculiar shape of the leaves of their parents.

SHORT NOTES.

SCROPHULARIA NODOSA, *var.*—I have specimens gathered by myself, viz.: 1. With green flowers; Tenby, Aug., 1848. 2. With green flowers; Cærnarvon, Aug., 1863. 3. With pale flowers; Tralee, Kerry, July, 1841. I presume that the real colour was the same in all these cases. I have noticed a pale-flowered form in all the editions of my "Manual."—C. C. BABINGTON.

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AGRIMONIA ODORATA.—I found this at the Burn of Mar Balmaha, Stirlingshire, August 27th, 1877, in some quantity. The station reminds me very much of that in Glen Eaisdale, Annan.—S. CRAIG-CHRISTIE.

ROSA MOLLIS, *Sm.*, IN HERTS.—In August, when riding between Welwyn and Hitchin, my attention was drawn to the peculiar look of the leaves of a Rose in the roadside hedge, and on examination it proved to be *Rosa mollis*. There were several bushes scattered over the space of one hundred and fifty yards, and were of large size, owing no doubt to the height of the hedge in which they grew. A plant growing about two miles east of Welwyn collected by me in 1875 has been referred to *R. mollis* by Mr. Baker, but it is not the type.—T. B. BLOW.

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HOW TO PRESERVE THE SPORES OF AGARICINI AND POLYPOREI.—Cut the pileus from the stem at the level of the gills and place it on a piece of thick blotting-paper (the colour of which is to be chosen to show the colour of the spores), covering it with a bell-glass, in order that there may be no movement of air which would disperse the spores, and that the pileus may be prevented from drying or shrinking. I have usually arranged this in the evening, and the constant succession of spores that are formed during the night fall upon the paper. Next

morning, after removing the glass, I pass my hand under the blotting-paper and turn it over with a curved movement, so as to allow the pileus to fall off without in the least disturbing the spores; if the pileus be lifted from the paper, it is very likely to displace them to some extent, for they are then so lightly deposited that they may easily be blown away. Then carefully wash the *under* side of the paper with very dilute gum-water applied with a small camel's hair brush, holding the paper up to the light during the process, that the space requiring to be moistened may be seen, and that the gum-water may be equally distributed. Care must be taken not to make the paper too wet, for then the spores will "run." When dry they will be found so securely set that they may be gently swept by a brush without injury—but they will not bear much rubbing. Then with a larger brush wash over the spores with collodion, often repeating the operation when the first coating is quite dry. After this the spores remain perfectly secure, and retain their colours for years. This answers as well for *Polyporei* as for *Agaricini*—in the former case the sizes and forms of the spores, and in the latter those of the gills, being shown on the paper.—A. LISTER.

Extracts and Abstracts.

INFLUENCE OF LIGHT AND RADIANT HEAT ON TRANSPIRATION.

Untersuchungen über den Einfluss des Lichts und der strahlenden Wärme auf die Transpiration der Pflanze. Von Dr. JULIUS WIESNER. (Sitzb. der K. Acad. d. Wiss. 1876. Translated in Ann. des Sc. Nat., 1877, p. 145.)

DAUBENY, who worked at the question of the relation between transpiration and the different rays of the spectrum, did not come to any definite conclusion about such a relation; but recently Déherain has found that the luminous rays exert the greatest effect, and thinks that transpiration in saturated media takes place through the agency of the heat obtained by the decomposition of carbonic acid. The present author combats Déherain's position, and, employing an improved method, concludes that the action of light on transpiration does not depend on its luminosity, but on its transformation into heat inside the plant. Below are cited the results of some experiments which bear out his view.

Progress of transpiration during alternations of light and obscurity.—When a plant is transferred from obscurity to light, transpiration is at first more active, but it gradually diminishes, external conditions remaining the same, and finally becomes stationary. The same thing, though to a different amount, is observed when the plant is brought into obscurity from light, Thus a plant of *Hartwegia comosa* which had remained in darkness twelve hours, was exposed to the illumination of a gas-flame, and the temperature and hygrometric

state remaining constant within very narrow limits, gave the following result—

				Milligrammes of water-vapour.
After the	1st	hour the plant had disengaged		59
,,	2nd	,,	,,	48
,,	3rd	,,	,,	44
,,	4th	,,	,,	42

And the last figure was returned for the next five hours.

The same plant, after eighteen hours' exposure to light, was removed into obscurity, and external conditions remaining almost invariable.

				Milligrammes of water-vapour.
After lapse of	1st	hour it had disengaged		31
,,	2nd	,,	,,	30
,,	3rd	,,	,,	29

And transpiration became stationary at the last figure. The result, which was supported by an experiment with *Zea Maïs*, shows that the plant is capable of only slowly placing itself in equilibrium of temperature with a new medium.

Transpiration of green and of chlorophyll-less organs in obscurity and in light of variable intensity.—The immediately following experiments show that very green organs are much more sensible to light than those which are provided with a small quantity of chlorophyll, and that the former transpire much more copiously than the latter.

Three young Maize plants with a surface of 31 square centimetres and three etiolated ones of 43 square centimetres were compared, and the ratio between transpiration under diffused light and under direct light was—

In the green	plants as	1	to 3·9
,, etiolated	,,	1	to 1·7

These figures being obtained by waiting till the action is constant. The difference is, however, more striking if the figures obtained at the end of the half-hour are used; thus the proportion is now—

With the green	plants as	1	to 7·6
,, etiolated	,,	1	to 1·8

Further experiments with three Maize plants gradually becoming green, and with three others kept in obscurity, showed that as the organs of the former increased in greenness a greater quantity of watery vapour was transpired, and much more than with the plants kept in darkness.

Flowers of *Spartium junceum* having a surface of 190 square centimetres, and the yellow colouring-matter of which gives the spectrum of xanthophyll, transpired—

	Milligrammes per hour.
In obscurity	123
In diffused light	131
In full sunlight	331

Flowers of *Lilium croceum* (156 square centimetres of surface, colouring-matter with faint band in blue and strongly marked absorption in indigo and violet) gave—

	Milligrammes per hour.
In obscurity	60
In diffused light	93
In full sunlight	178

White flower of *Malva arborea* (150 square centimetres of surface, weak colouring-matter with spectrum of *Lilium croceum*, but only for the space of 2 centimetres) showed—

	Milligrammes per hour.
In obscurity	35
In diffused light	42
In full sunlight	95

The comparative list stands thus—

Amount of water-vapour in milligrammes disengaged per hour for every 100 square centimetres

	Obscurity.	Diffused light.	Sunlight.
Spartium junceum	64	69	174
Lilium croceum	38	59	114
Malva arborea	23	28	70
Etiolated Maize	106	112	290
Green	97	114	785

Influence of the ultra-red rays on transpiration.—Déherain, by exposing a plant in saturated air behind a solution of iodine in sulphide of carbon, which allows only these rays to pass through, came to the conclusion that they have no effect on transpiration. The present author has, however, arrived at a precisely opposite result.

Relation between refragibility of light and transpiration.—An experiment made with three very green Maize plants not in a saturated medium, gave the following for the effect of the different colours on transpiration—

	Milligrammes per hour.
Red	136
Orange	122
Blue	146
Ultra-violet	70
Obscurity	62

And this was supported by many other experiments, both in saturated and in unsaturated media.

The author concludes "that the presence of chlorophyll increases notably the action of light on transpiration; that the rays corresponding to the absorption-bands of the spectrum of chlorophyll, and not the most luminous ones, have greatest effect in transpiration; and that the rays which have traversed a solution of chlorophyll have only a feeble influence." He also claims to have discovered a new function of chlorophyll.

LIFE-HISTORY OF BOTRYDIUM.

Ueber Botrydium granulatum. Von I. ROSTAFINSKI und M. WORONIN. (Bot. Zeitung, October, 1877. With 5 plates.)

THE singular little plant with which this memoir deals has hitherto been more remarkable for the number of names it has borne than for the knowledge possessed of its history. Almost every author who has had to deal with it has quietly passed on, contenting himself with the addition of another synonym; but as "every bullet has its billet," so has every alga an actual or potential elucidator of its life-processes. These, in the case of *Botrydium granulatum*, are now before us very nearly in their entirety, and we propose briefly to run over them.

If a green globe—the "ordinary zoosporangium"—be placed in a drop of water, numbers of zoospores are formed from it either towards the latter part of the day or during the night. If, however, the globe be only moistened with water the zoospores come to rest without escaping: they bear at one end a single long cilium, and after swimming about for a short time they become quiescent, assume a spherical form, and if brought on to moist earth immediately germinate. In germination the side turned towards the ground sends out a short hyaline branch, which buries itself in the ground, while the upper air-exposed part grows up in the form of a chlorophyll-filled cylinder. We have now before us, in fact, Kützing's *Protococcus botryoides*, so that Mr. Berkeley's surmise about this latter has proved in the main a very happy one. This growth is distinguished as the "vegetative plant." If now, instead of placing the alga in water, it is exposed to sunlight or drought, the globe begins to shrink up, and its contents collect in the underground branches, which they fill in the form of a necklace of cells. These cells are capable of three-fold development: firstly, if placed in a drop of water their membrane swells up, breaks through the wall of the root and becomes an underground zoosporangium; secondly, a row of these root-cells laid on moist earth grow up directly into vegetative plants; lastly, if the cells be left to themselves, care being taken to keep the culture moist, they germinate, swell up like a bladder, and send out a hyaline root-prolongation, the wall of which is very much thickened under the small, nearly circular olive-green bladder; this is the "hypnosporangium," an organ which, if dried, retains its capacity for germination throughout the entire year, and shows no day-and-night relation in the formation of its zoospores, a fact in which it resembles the underground zoosporangium. The vegetative plant can multiply either by the constriction and ultimate separation of portions of the cylinder, or by direct production of zoospores, or by becoming an ordinary zoosporangium, or even a hypnosporangium. When, however, it is exposed to drought or sunlight the chlorophyll breaks up into cells in number proportional to the size of the mother-plant; the green contents of these cells or "spores" change to red after a time. Placed in water the spores become zoosporangia, from which a swarm of biciliated zoospores escapes; these die when isolated, but under ordinary circumstances they copulate either two or several together. The round isospore resulting from this copulation developes into an ordinary vegetative plant, a fortnight being necessary for completion of its growth; but

it can also undergo a period of rest lasting at least over the year of production, becoming in this case harder, flattened, and hexagonal, with local thickenings on the sides and round the margin. The isospore produces the vegetative plant as the result of its germination, whether this be immediate or takes place after the rest-period.

Careful distinction is drawn between primary and subsidiary phenomena. In the former we have the series consisting of isospore, vegetative plant and spores with sexual zoospores; in the latter the chief place is to be given to division (constriction) and zoospore-formation in vegetative plants, these processes forming an integral part of the first asexual generation: the transformation of the vegetative plant into an ordinary zoosporangium is secondary among subsidiary phenomena and massing of the plasma in the root of the ordinary zoosporangium with the resulting processes tertiary.

In spring the vegetative plants usually develope into ordinary zoosporangia, thus ensuring a considerable multiplication of individuals and their diffusion over a wide area. In summer, on the contrary, they are chiefly engaged either in division or in spore-formation. The plant with its extraordinary number of processes furnishes us with an extreme case of adaptation to varying external conditions, and it ought to prove most useful for teaching purposes.

The author constitutes *Botrydium* as the type of a tribe (Botrydiaceæ) of *Isosporeæ* equivalent to *Pandorineæ* and *Hydrodictyeæ*.

The Digestion of Albumen (Perisperm).

Sur la Digestion de l'Albumen. Par M. P.h. van Tieghem. (Annales des Sciences Naturelles, 1877, p. 180.)

In order to ascertain the way in which the assimilation of albumen takes place, the author isolated the fleshy albumen of *Ricinus*, the mealy albumen of *Mirabilis* and *Canna*, and the horny albumen of *Aucuba* and *Phœnix*, and placed them under suitable conditions for culture. With *Ricinus* swelling of the mass occurred after some days, accompanied by absorption of oxygen and elimination of carbonic acid. Meanwhile the grains of aleurone gradually dissolved, their amorphous covering first disappearing, then the globoid and crystalloid becoming disassociated and dissolving in turn. This solution of aleurone began first in the circumferential cells of both sides, at the same time the oil slowly diminished in quantity as well as the dry matter of the albumen. The new substances formed were starch—the occurrence of which is highly noteworthy at the present time—and a rose colouring matter, similar to that found in the epidermal cells of the plumule and of the nerves of the cotyledons, produced in certain isolated or grouped cells. The mealy and horny albumen, on the contrary, remained unchanged.

Under normal conditions of germination the result with *Ricinus* was the same as before, except that the action was much more rapid and no starch was formed. In this case dissolution was centripetal, while it was centrifugal in the germination of the above-named seeds with mealy and horny albumen.

The conclusion is that fleshy albumen is endowed with independent activity in germination, the embryo having only to absorb matter already dissolved; but the embryo of seeds with mealy and horny albumen evolves a fluid rendering the latter soluble.

Notices of Books.

The Different Forms of Flowers on Plants of the Same Species. By Charles Darwin, M.A., F.R.S. Murray. London. 1877.

It is usually the fortune of great authors to have their fragments brought together by a not necessarily sedulous or over-wise editor, and by this means it often happens that sufficient justice is not done to them. That there is no danger of this occurring in Mr. Darwin's case is again shown by the volume at present before us, in which the memoirs on dimorphism and trimorphism are rescued from the comparative oblivion of the "Linnean Proceedings." The subject is so bizarre that one cannot wonder at its attracting the notice and experimental energy of several observers; and the results of Scott, Hildebrand, H. Müller, &c., have been worked in with the original material, the details of which they so strikingly confirm. For the whole subject Mr. Darwin prefers Hildebrand's term of Heterostylism; its origin he explains by way of variability in the length of pistils and stamens, with almost simultaneous manifestation of the special reproductive affinity. It is insisted that great care is requisite before heterostylism can be definitely predicated of a species, since this consists not simply in difference in length of styles and stigmas, but also in size and often in colour of the pollen-grains, in size of the anthers and of the stigmatic papillæ, and finally in fertilisation. When, however, we can be certain that a plant is truly heterostyled, Mr. Darwin holds—and this seems to us the *crème de la crème* of the book—that we have before us an arrangement for effecting cross-fertilisation in every way comparable with the other means for ensuring the same end; viz., diœcism, dichogamy, self-sterility, prepotency of foreign pollen and entomophily.

The separation of the sexes in phanerogamous plants which are thought to have descended from hermaphrodite ancestors is a subject which has already brought out the ingenuity of the present author, and we are again indebted to him for some more light on the subject. He suggests that diœcious plants have arisen from the species having been exposed to conditions unfavourable for the production of pollen and ovules by the same individual, it being evident that cross-fertilisation with its benefits is not the object of the modification, because a species must have been adapted to cross-fertilisation before its assumption of diœcism, or otherwise sterility would have resulted. On this view, then, diœcism is a phenomenon of degradation, an opinion which, however it may conflict with current notions derived from the animal kingdom, has our strong support. Mr. Darwin does

not pin his faith definitely to this, however, and shows that some individuals might vary beneficially by maturing larger seeds, and that by compensation the production of pollen would be lessened; but that as soon as this took place, other individuals would vary by producing more pollen to make up for the diminution in the others, and have their ovules reduced in size by compensation; this process might evidently go on until diœcism was arrived at.

On the origin of gyno-diœcism, or production of species consisting of females and hermaphrodites, we feel compelled to differ from Mr. Darwin. H. Müller, struck by the smaller size of the corollas of the female flowers, supposes that some individuals varied by bearing larger flowers which were preferred by insects to the smaller ones, under which circumstances the latter were saved the now superfluous task of producing pollen. The view adopted in the present volume is supported by three isolated experiments (two of which were unfortunately on cultivated plants, and one of the two of very doubtful nature), which showed that the females are more productive in seeds than the hermaphrodites, and would lead to the belief that increased fertility is the cause of the separation of the two forms, the smaller size of the female flower resulting from the spreading of the tendency to abortion from the androecium to the corolla. For ourselves we cannot help thinking that gyno-diœcism can be better explained on the view of a sufficiency of pollen for the fertilisation of all the individuals of a species being produced by only a few of the flowers, so that instead of some of the anthers of all the flowers becoming abortive—a very common occurrence—we see here abortion of all the anthers of some of the flowers. This simple suggestion is borne out by the result of Mr. Darwin's experiment with *Satureia hortensis*, in which it was found that bees were able to fully fertilise ten female flowers with pollen from a single male, and also by the fact that all known instances of gyno-diœcism relate to species which have the maximum of stamens possessed by the orders to which they respectively belong, and are without any specially complex entomophilous structure. We may also remark on the pauciovulate condition of gyno-diœcious species, and ask why do we not see this form of sexual separation in multiovulate ones, where a much greater effect would undoubtedly be obtained? The result of Mr. Darwin's experiments on fertilisation (such as they were) does not militate against us, for it is easy to understand that at any time it would be advantageous to the species if the anthers were as well provided with pollen as possible, and this might result, by compensation, in somewhat diminished fertility. We think, though, that Mr. Darwin's explanation of the reduction in size of the female corolla is correct.

The closing chapter deals with cleistogamy, and contains Kuhn's list,* with a few emendations and additions. This wonderful pheno-

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* This list contains the two Asclepiadeous genera *Stapelia* and *Hoya*. It is indeed difficult to conceive cleistogamy in this order, and our suspicions were aroused on first perusing the list. Since then Mr. N. E. Brown, who is making a careful study of *Stapelia*, has informed us that he doubts whether the flowers of this genus are ever cleistogamic. After pollination, he says, the corolla falls off, and the calyx-lobes close over the ovary, the flower remaining in this condition till the next year, when the ovary begins to swell.

menon is thought to owe its origin in part to the liability of the perfect flowers to fail in their fertilisation, owing to stress of weather or absence of the fertilising insects. A self-fertilisable plant may also have been prevented, either at the beginning or at the close of the season, from properly expanding its flowers, but not have lost its capacity for self-fertilisation. Natural selection might then complete the work, and cause strict cleistogamy. This chapter seems to be less satisfactory than the others, for not only does Mr. Darwin appear to us to lay too much stress on the mere morphological peculiarity of reduction in size of the floral parts as a criterion of a phenomenon essentially physiological, but he omits from the list of cleistogamous species all mention of the *Vandeæ*, which affords very striking instances when their high entomophilous specialisation is considered. He is also incorrect in saying that in *Epidendrum* the parts of the closed flowers are not reduced in size, for we have ourselves seen a living specimen from Trinidad in which the contrary was plainly the case. *Apropos* of *Leersia*, we would suggest that someone should examine other grasses—such as *Panicum* and *Rottboelliaceæ*—for detection of cleistogamy. Incidentally, too, we may mention that the plant on which Philippi s genus *Heterocarpæa* was founded is nothing more than a *Cardamine* (probably *C. chenopodiifolia*, St. Hil.), and that the strangeness of the pod of the cleistogamic flowers being a silicula is lessened by Dr. Hance's discovery of a species growing in China (*C. paradoxa*, Hance), in which this is the ordinary form of fruit.

S. M.

Proceedings of Societies.

Linnean Society—*November* 1*st*, 1877.—Prof. Allman, F.R.S., President in the Chair. Messrs. S. M. Samuel and P. Wyatt Squire were elected Fellows.—The Rev. T. H. Sotheby of Langford, Budville, Somerset, exhibited branches of a shrub, originally obtained by him from Lady Rolles's garden at Bicton. It was described and figured by Dr. Lindley in vol. 5 of the Journ. Hort. Soc., under the name of *Colletia bictonensis*, and then stated to be a seedling raised from *C. spinosa*. It had, however, been described in the Botanical Miscellany by Sir W. J. Hooker, twenty years before, under the name of *Colletia cruciata*, from dried specimens collected by Dr. Gillies, near Maldonado, Rio

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Mr. Brown thinks it probable that this calyx-closed state has been taken for a cleistogamic one, and this probability is strengthened by the presence of five glands looking like aborted petals between the calyx and the ovary. Is it not possible that a similar mistake may have been made with *Hoya*? It is a pity that Mr. Darwin should have trusted to Maximowicz's earlier description of *Kaschenikowia* (he appears not to have seen the recent revision), so as to eliminate it from the cleistogamic list, and, in so doing, to broach a most unfortunate suggestion concerning its fertilisation. There is not the slightest doubt but that the genus is truly cleistogamic.

de la Plata, and a flowering branch, stated to have been reared by Mr. Veitch in Devonshire, was subsequently figured in the Botanical Magazine for 1858.—Mr. Alfred O. Walker called attention to specimens of Gum Trees (among others *Eugenia apiculata*), *Fremontia californica* and *Pentstemon Clevelandii*, growing freely near Chester; it is said to be the first time the latter species has flowered in Britain.—Some adventitious tubers producing buds on the root of *Brassica Rapa* were shown and commented on by Dr. Maxwell Masters, and he also exhibited an example of a grape within a grape adventitious fruit in place of seed. Mr. E. M. Holmes drew the attention of the Society to a piece of sugar-cane containing a fungus sent to him for examination. This fungus, as yet undetermined, is stated to have caused the destruction of a plantation in the Soult, India. The following papers were read:—"On the source of the winged Cardamom of Nepal," by Dr. George King, Supreintendent Royal Botanic Gardens, Calcutta. The author had been requested by the late Mr. Daniel Hanbury to inquire into the botanical origin of this drug; the result, owing to Mr. Hanbury's untimely death, has hitherto remained unpublished. By Dr. Pereira this Cardamom was regarded as the produce of *Amomum maximum*, Roxb, but this in reality is indigenous to Java. The Indian species Roxburgh named *A. aromaticum* and a second species he called *A. subulatum*. Dr. King brings forward evidence to show that the latter species, and not *A. maximum*, yields the so-called winged Cardamom of Nepal; its true habitat is the Morung mountains and not the Khasia hills, as Voigt has asserted. A series of specimens illustrative of the above paper from the herbarium of the late D. Hanbury (now the property of the Pharmaceutical Society) was exhibited, including the ones sent by Dr. King.—"On the Self-fertilisation of Plants," by the Rev. George Henslow. The author in introducing his subject spoke in terms of great respect and admiration of the immense number of facts and fund of able reasoning contained in the published writings of Darwin, which the author admitted he had freely used, though his own conclusions tended towards a different result. According to the views of Mr. Henslow, given in detail in his communication, the chief facts concerning self-fertilisation may be summarised as is here subjoined:—1. The majority of flowering plants are self-fertile. 2. Very few are known to be physiologically self-sterile. 3. Many are morphologically self-sterile. 4. Self-sterile plants become self-fertile by (*a*) withering of the corolla; (*b*) its excision; (*c*) loss of colour; (*d*) closing; (*e*) not opening; (*f*) absence of insects; (*g*) reduction of temperature; (*h*) transportation. 5. Highly self-fertile forms may arise under cultivation. 6. Special adaptations occur for self-fertilisation. 7. Inconspicuous flowers are highly self-fertile. 8. Cleistogamous flowers are always self-fertilised. 9. Conservation of energy in reduction of pollen. 10. Relative fertility may equal or surpass that of crossed plants. 11. It does not decrease in sucessive generations. 12. It may increase. 13. Free from competition self-fertilised plants equal the intercrossed, (*a*) as seedlings; (*b*) planted in open ground. 14. They may gain no benefit from a cross from the same or a different stock. 15. They are as healthy as the intercrossed. 16. They may be much more productive than flowers dependent on insects. 17. Naturalised

abroad they gain great vigour. 18. They are the fittest to survive in the struggle for life. Considerable discussion followed the reading of this paper.

Botanical News.

Articles in Journals.—October.

Scottish Naturalist.—J. Stirton, "New Lichens."

Monthly Microscopical Journ.—A. Grunow and F. Kitton, "New Diatoms from Honduras" (tab. 113-116).

Flora.—R. Caspary, "Memoir of A. Braun."—H. Christ, "*Rosa*-forms observed in 1876."—W. Nylander, "Addenda nova ad Lichenographiam Europæam" (20 new. sp., 10 British).—J. Müller, "Lichenographical Notes" (contd.).

Bot. Zeitung.—O. Drude, "Selected examples illustrating the structure of the fruit of Palms" (contd.).—J. Baranetzky, "Diurnal Periodicity of growth in length of Internodes."—C. J. Oudemans, "On *Boletus Oudemansii*, *B. fusipes*, and *B. placidus*."—I. Rostafinski and M. Woronin, "On *Botrydium granulatum*" (tab. 7-11) [see p. 373]. —K. Goebel, "Development of the prothallium of *Gymnogramma leptophylla*" (tab. 12).

Oesterr. Bot. Zeitschr.—W. O. Focke, "Studies in Rubi."—E. von Thuemen, "A new Austrian *Tilia*"—A. Kerner, "Distribution of Hungarian plants" (contd.).—Vukotinovic, "On the Flora of Croatia."—F. Antoine, "Botany of the Vienna Exhibition" (contd.).

Magyar Novénytanilopok.—J. Sachs, "On arrangement of cells in recent parts of plants."—J. L. Holuby, "On the cultivation of *Althæa rosea* and on *Puccinia Malvacearum*."—L. Simkovics, "Plants of Tokai Hegyalia."

Nuovo Giorn. Bot. Ital.—O. Beccari, "On *Scorodocarpus*, a new genus of *Olacineæ* and on *Ximenia*" (tab. 11).—T. Caruel, "Divisiones Plantarum."—R. Gregorio, "Botanical account of the expedition of Porta and Rigo to the southern provinces of Italy in 1875."

New Books.—E. Fries, "Icones Selectæ Hymenomycetum nondum delineatorum." Vol. II., fasc. 1. (Stockholm. 13s.)—R. H. C. C. Scheffer, "Annales du Jardin Botanique de Buitenzorg." Vol. I. (24 Plates. Van Diep. Batavia and Haarlem.)—"Flora Danica." Heft 49. (Copenhagen.)—H. Leitgeb, "Untersuchungen über die Lebermoose. Heft 3. Die frondosen Jungermannien." (Jena. 9 plates.)

In the "Oversigt" of the Danish Academy, Prof. Lange publishes some critical remarks on the more important plants figured in the last (49th) part of the "Flora Danica." the first of the final volume by which this great national work will be completed. In the same publication Dr. Warming records his researches on the structure and affinities of the *Cycadeæ*, which are illustrated by 3 plates.

Prof. Morren has brought out a 5th edition of his useful list of Botanical Establishments and Botanists. It is well brought up to date, and considerably increased, extending to nearly a hundred pages. All botanists ought to help to render this directory as complete as possible by sending additions or corrections to Prof. Morren at Liège, who hopes to issue the list for the future annually in May.

At the meeting of the Eastbourne Natural History Society on October 19th, Mr. Roper gave an account of the additions to the Flora of the district made since 1875. He estimated these at 100 Phanerogams, and about 230 Cryptogams, mostly Fungi, certainly a large number.

There is a catalogue of the Ferns and Fern allies of Shropshire by Mr. W. Phillips in the Transactions of the Archæological Society for this year.

Baron von Mueller has undertaken a voyage to Shark's Bay, West Australia, with the object of endeavouring to ascertain the geographical limits of the tropical and the South Australian floras. Very little is known of the botany of this district.

The death of Robert Heward occurred at Wokingham on October 24th, at the age of eighty-six. He was at one time officially connected with the Horticultural Society, afterwards managed for five years a coffee plantation in Jamaica, and though not himself a professed botanist, was on terms of friendship with the leading ones of his day. The great Australian collection of Allan Cunningham was bequeathed to Mr. Heward, who presented the "study set" to the Kew herbarium; the biographical account of Cunningham in Hooker's "Journal of Botany" was written by Mr. Heward; who also published an account of the ferns of Jamaica in the "Magazine of Natural History" for 1838. A genus of ferns, *Hewardia*, was dedicated to him by his friend John Smith, formerly curator of Kew Gardens.

Mademoiselle Henrietta Cerf, who died at Brussels on October 22nd in her sixty-seventh year, possessed a good knowledge of European plants, especially those of Belgium. She was the author of several original papers and translations published in the new series of the "Phytologist."

The executors of the late Dr. Welwitsch have placed the following inscription on his tomb in Kensal-green Cemetery:—"Fredericus Welwitsch, M.D., Botanicus eximius, Floræ Angolensis investigatorum Princeps. Nat. in Carinthia, 25 Feb., 1806; ob. Londini, 20 Oct., 1872." The inscription is surmounted by a *Welwitschia* plant carved in relief.

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ERRATA ET CORRIGENDA.

Page 31, line 8, *for* "*Lycopodaceæ*," *read Lycoperdaceæ.*
63 19, *for* "*Ros-sinensi*," *read Rosa sinensis.*
64 13, from bottom, *for* "Dr. R. Brown," *read* Rev. J. C. Brown.
65 25, *for* "connectivo lato truncato," *read* connectivum latum truncatum.
67 14, *for* "stigmato," *read* stigmate.
68 27, *for* "zones," *read* zone.
69 22, *for* "eviter," *read* leviter.
70 2, *for* "densis," *read* densus.
71 4 from bottom, *for* "confertæ," *read* conferti.
131 16 ,, *for* "nomem," *read* nomen.
151 19, *for* "Notices of Books," *read* Extracts and Abstracts.
159 6 from bottom, *for* "*Fawcettiæ*," *read Fawcettia.*
179 22, *dele* comma after "Innish."
180 4, *for* "Redruch," *read* Rednack.
192 The genus *Reevesia*, Lindl.. was named to commemorate John Reeves, the father of the J. R. Reeves whose death is here recorded.
202 *dele* line 9 from bottom.
206 16, *for* "Swartz," *read* Swartzii.
209 5, *for* "Christig," *read* Christie.
222 11 from bottom, *for* "Gardoger," *read* Gandoger.
255 25 ,, *for* "Geneva," *read* Genoa.
255 13 ,, *for* "America," *read* Armenia.
268 7, *for* "*inebriens*," *read inebrians.*
269 3, *for* "uniseriatum," *read* uniseriatim.
287 7, *for* "Corinthia," *read* Carinthia.
288 22, *for* "last month," *read* July 22nd.
288 13 from bottom, *for* "Departments," *read* Department.
290 17, *for* "puberula," *read* puberulum.
292 7, the ? applies to the section not to the genus.
292 23, *for* "petiolula," *read* petioluli.
292 15 from the bottom, *for* "Vidi," *read* Sunt.
293 24, for "Ahchisihama," *read* Shchirihama.
295 13 from bottom, *for* "superno," *read* superne.
295 4 ,, *for* "reperta," *read* repertum.
296 13, *for* "Otsuku," *read* Otsuka.
296 21, *for* "Oeso," *read* Oiso.
296 33, *for* "Mjagase," *read* Miyagase.
296 41, *for* "Garuma," *read* Guruma.
297 22, *for* "Kanagawa. November," *read* Oyama. October.
297 26, *for* "Manadzuru. May," *read* Oyama. October.
297 38, *add* Oyama. October.
298 4 and 11, *for* "Mujanoshta," *read* Miyanoshta.
298 15, *for* "Mujagi," *read* Miyagi.
309 16, *for* "Oepidiopsis," *read* Olpidiopsis.
323 footnote, line 2 from bottom, *add* vol. vii., pp. 284, 5.
324 31, *for* "Royal," *read* Ray.
350 4 from bottom, *for* "Ngama," *read* Oyama.

A few other Errata are corrected at the foot of page 96.

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RANKEN & Co., Printers, Drury House, St. Mary-le-Strand, London W.C.